ROBINSON & COLE LLP

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

ORIGINAL

March 17, 2009

Michael Perrone
Siting Analyst
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Cellco Partnership d/b/a Verizon Wireless**
Exempt Modification Approval

Dear Mr. Perrone:

Enclosed you will find a Post-Construction Observation Report and Post Construction Structural Analysis Reports confirming that the modifications needed prior to Verizon Wireless' antenna installation was completed in accordance with the requirements of the Structural Analysis submitted as a part of the exempt modification filing referenced below. The attached report relates specifically to the following Siting Council filing.

1. EM-VER-014-080602
Branford 3 – 21 Acorn Road, Branford, CT

If you have any questions regarding any of these materials, please do not hesitate to contact me or Rachel Mayo.

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Sandy M. Carter
Brian Ragozzine
Mark Gauger

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215

March 15, 2009

Tom Warchol
Crown Castle International
5500 Flatiron Parkway
Suite 100
Boulder, CO 80301
570-455-7736

Subject: Post Construction Observation Report

Crown Castle Designation	**Crown Castle BU Number:**	**876316**
	Crown Castle Site Name:	**Secondino Property**
Engineering Firm Designation	**Paul J. Ford and Company**	**41708-0180**
Site Data	**21 Acorn Road, Branford, New Haven County, CT** **Latitude 41° 17' 35.06", Longitude -72° 45' 46.4"**	

Dear Tom Warchol,

Paul J. Ford and Company is pleased to submit this "Post-Construction Observation Report" for the modifications recently performed on the aforementioned monopole. The purpose of the report is to verify that the pole modifications were installed in accordance with the drawings produced by Paul J. Ford and Company. You will find a copy of the record drawings attached to the post-construction structural analysis report.

The modifications required installing MP3 shaft reinforcement and transition stiffeners. Based on the construction photos, construction observation letter and supporting documents by Aero Solutions LLC., we feel that the modifications were completed in accordance with the design intent indicated on our drawings. Structural capacity of the existing reinforced monopole is less than 98%.

We at Paul J. Ford and Company appreciate the opportunity of providing our continuing professional services to you and Crown Castle International. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted,

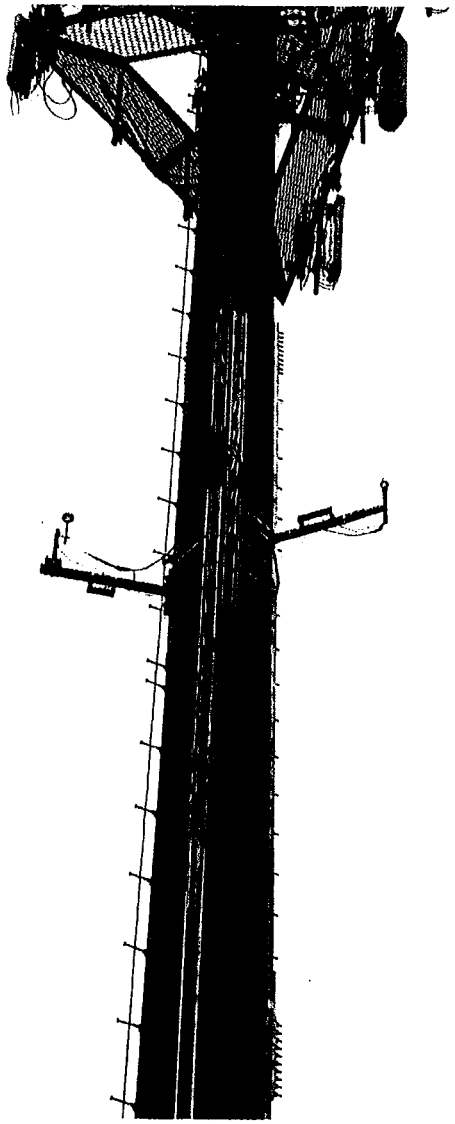
U.K.

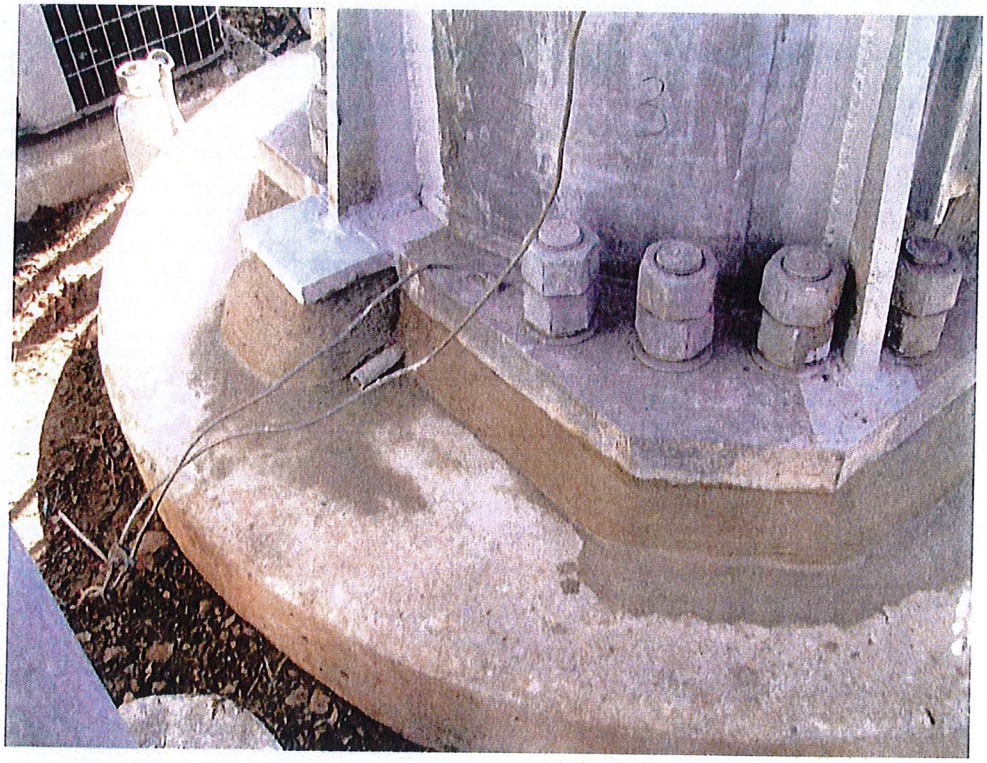
Udaykiran Yerra
Structural Engineer

STATE OF CONNECTICUT
JOSEPH PACHIGA
No. PEN 22731
REGISTERED
PROFESSIONAL ENGINEER

MAR 16 2009

G:\TOWER\417_Aero_Solutions_LLC\2008\41708-0180_876316_Secondino Property\41708-0180 Closeout\41708-0180_Observation_Report.doc





Aero*Solutions* LLC

Optimizing Your Tower Infrastructure

103 Rotary Drive
West Hazleton, PA 18202

Phone: 570-455-7736
Fax: 570-455-9881

March 11, 2009

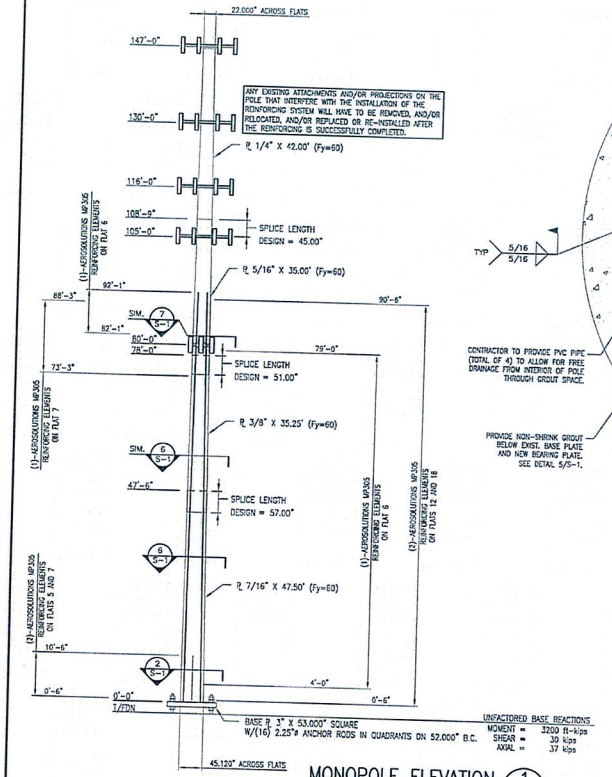
Customer: Crown
Site #: 876316
Site Name: Secondino
1394 Route 322
Southington, CT 06489

Scope: Work on this project consisted of the welding of transition stiffeners and the bottom of the reinforcement channel all in accordance with the approved PJF drawings dated 12/12/08.

Transition Stiffener Welding: All galvanizing was removed in the areas to be welded. Welding was performed in accordance with AWS D1.1 2008 Structural Welding Code and Aero Solutions Field Welding Procedure (Stiffener/Anchor Rod Brackets to Monopole Tower Wall/Base Plate). Upon completion all welds were visually inspected and checked for the correct fillet size which was 5/16 " for the vertical weld and a beveled weld with a 1/2" reinforcing fillet for the horizontal weld on the stiffeners. The channel required a 3/8" fillet weld on both sides from the bottom of the channel to the first hole. Pictures were taken throughout the entire process and final pictures upon completion. The base area was painted with ZRC to a thickness of 3 mls.

Ron Skasko
Aero Solutions
Quality Coordinator
ASNT Level II UT & MT, CWI

THIS POLE REINFORCEMENT DRAWING IS FOR THE POLE DESIGN AND ANTENNA LOADING DOCUMENTED IN THE PJF CO-LOCATION ANALYSIS FOR THIS SITE (PJF#41708-0180_BP), DATED 3-16-2009.



UNFACTORED BASE REACTIONS
MOMENT = 3200 ft-kips
SHEAR = 39 kips
AXIAL = 37 kips

MONOPOLE ELEVATION 1 S-1
SCALE: NTS

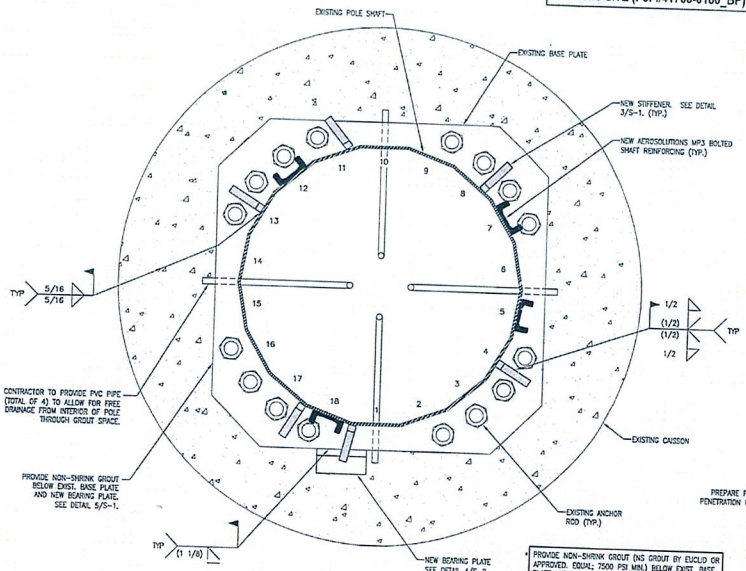
LOAD CASES		
CASE 1	85 MPH WITH NO ICE	DESIGN WIND
CASE 2	74 MPH WITH 1/2" RADIAL ICE	REDUCED WIND WITH ICE
CASE 3	50 MPH WITH NO ICE	OPERATIONAL WIND

POLE SPECIFICATIONS	
Pole Shape type:	18-SIDED POLYGON
Taper:	0.170034 IN/FT
Shaft Steel:	ASTM A607 GRADE 60
Base PL Steel:	ASTM A572 GRADE 50 (50 KSI)
Anchor Rods:	2 1/4 ø #18J ASTM A615 GRADE 75

SHAFT SECTION DATA

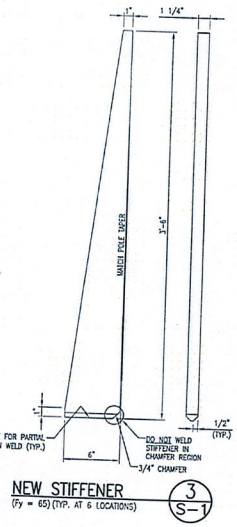
Shaft Section	Section Length (feet)	Plate Thickness (in.)	Lap Splice (in.)	Diameter Across Flats (inches) @ Top	Diameter Across Flats (inches) @ Bottom
1	42.00	0.2500	45.00	22.000	29.141
2	35.00	0.3125	51.00	28.004	33.955
3	35.25	0.3750	57.00	32.607	38.601
4	47.50	0.4375		37.043	45.120

NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES

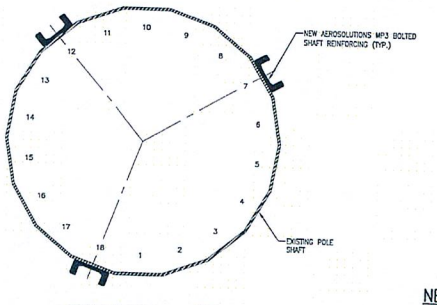


BASE PLATE PLAN 2 S-1

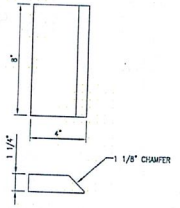
* PROVIDE NON-SHRINK GROUT (NS GROUT BY EUCLID OR APPROVED. EQUAL; 7500 PSI MIN.) BELOW EXIST. BASE PLATE AND NEW BEARING PLATES. PRIOR TO GROUTING, INSTALL FOUR 1-INCH DIAMETER PVC DRAIN PIPES AT APPROXIMATELY NINETY (90) DEGREES APART THROUGH GROUT SPACE. GROUT SHALL BE INSTALLED TIGHT UNDER BASE PLATE WITH NO VOIDS REMAINING BETWEEN TOP OF EXISTING CONCRETE AND UNDERSIDE OF EXISTING BASE PLATE (EXCEPT FOR DRAIN PIPES). GROUT COMPLETELY SOLID UNDER ENTIRE SURFACE OF BASE PLATE FROM OUTSIDE EDGE TO INSIDE EDGE.



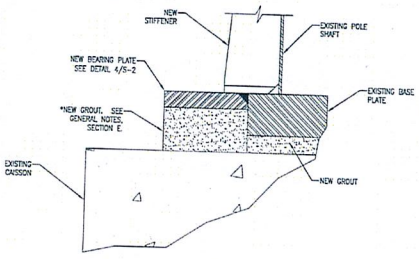
NEW STIFFENER 3 S-1
(Fy = 65) (TYP. AT 6 LOCATIONS)



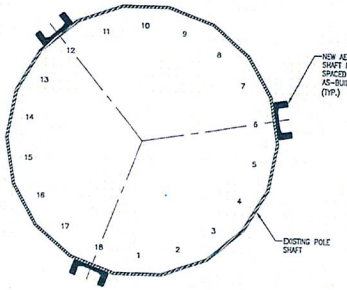
SHAFT PLAN 7 S-1



NEW BEARING PLATE 4 S-1
(Fy = 65) (TYP. AT 2 LOCATIONS)



NEW BEARING PLATE DETAIL 5 S-1
(TYP. AT 2 LOCATIONS)



SHAFT PLAN 6 S-1

THE FOLLOWING NOTES WERE PROVIDED ON THE CONSTRUCTION DRAWINGS FOR THIS SITE:

GENERAL NOTES:

1. POLE REINFORCING DESIGN MEETS THE RECOMMENDATIONS OF THE TIA/EIA-222-F 1996 FOR WIND SPEEDS OF 85 MPH AND 74 MPH WITH 1/2" RADIAL ICE.
2. ALL NEW SHAFT FLAT PLATE REINFORCING STEEL SHALL BE ASTM A572, GR 65. ALL NEW SHAFT CHANNEL REINFORCING STEEL SHALL BE ASTM A572, GR 50. ALL NEW BRACKET STEEL SHALL BE ASTM A572, GR. 50 (BRACKET PLATE) AND ASTM A53, GR. E (35 KSI; BRACKET PIPE). ALTERNATIVELY, NEW BRACKET PIPE MAY BE ASTM A106, GR B (35 KSI).
3. ALL STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123. ALTERNATIVELY, ALL NEW SHAFT STEEL REINFORCING MAY BE COLD GALVANIZED AS FOLLOWS: APPLY A MINIMUM OF TWO COATS OF ZRC-BRAND ZINC -RICH COLD GALVANIZING COMPOUND. FILM THICKNESS PER COAT SHALL BE: WET 3.0 MILS; DRY 1.5 MILS. APPLY PER ZRC (MANUFACTURER) RECOMMENDED PROCEDURES. CONTACT ZRC AT 1-800-831-3275 FOR PRODUCT INFORMATION.
4. AS REQUIRED ALL WELDING SHALL BE IN ACCORDANCE WITH AWS D1.1. ELECTRODES SHALL BE E70XX LOW HYDROGEN. THE CONTRACTOR SHALL FOLLOW ALL CCUSA WELDING AND SAFETY GUIDELINES AND AEROSOLUTIONS FIELD WELDING PROCEDURE.
5. AS REQUIRED PREPARE ALL FIELD WELDS ACCORDING TO AWS D1.1. REMOVE EXISTING GALVANIZING IN AREAS OF FIELD WELDS PRIOR TO WELDING.
6. PRIOR TO INSTALLATION OF SHAFT STEEL REINFORCING, JACK SLIP JOINTS AT 41' AND 80' ELEVATIONS WITH (2) 6 TON COME-A-LONGS. NOTE ANY MOVEMENT AND REPORT TO AEROSOLUTIONS FIELD PERSONNEL.
7. PRIOR TO CONSTRUCTION, CONTRACTOR SHALL NUMBER ALL FLATS WITH PERMANENT MARKER. NUMBERING MUST BE INSPECTED AND APPROVED BY AEROSOLUTIONS FIELD PERSONNEL.
8. CONTRACTOR SHALL MARK ALL PROPOSED LOCATIONS FOR NEW ANCHOR BOLTS AND NEW BRACKETS AND HAVE AEROSOLUTIONS FIELD PERSONNEL APPROVE LOCATIONS BEFORE PROCEEDING WITH FIELD WELDING OR DRILLING OF HOLES FOR NEW ANCHOR BOLTS.
9. NEW ANCHOR ROD REINFORCING (150 KSI RODS) SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS. ONCE ALL RESIN AND GROUT HAVE CURED, ALL NEW ANCHOR ROD REINFORCING SHALL BE PROOF LOADED TO 210 KIPS. ONCE THE PROOF LOAD HAS BEEN RELEASED, TIGHTEN HEAVY HEX NUT TO SNUG TIGHT PLUS 1/4 TURN OF NUT (REFER TO THE NEW ANCHOR & BRACKET DETAIL).
10. ONCE ALL CONSTRUCTION HAS BEEN COMPLETED, ANY AND ALL DAMAGED AREAS OF GALVANIZING SHALL BE TOUCHED UP WITH A MINIMUM OF TWO COATS OF ZRC-BRAND ZINC -RICH COLD GALVANIZING COMPOUND. FILM THICKNESS PER COAT SHALL BE: WET 3.0 MILS; DRY 1.5 MILS. APPLY PER ZRC (MANUFACTURER) RECOMMENDED PROCEDURES. CONTACT ZRC AT 1-800-831-3275 FOR PRODUCT INFORMATION.
11. CONTRACTOR SHALL COMPLY WITH, COOPERATE WITH, AND FOLLOW THE INSTRUCTIONS OF THE AEROSOLUTIONS FIELD PERSONNEL.

NOTE: RECORD DRAWING WAS PREPARED BASED ON THE INFORMATION AND 'AS-BUILT' DOCUMENTATION RECEIVED FROM AEROSOLUTIONS' QUALITY CONTROL INSPECTOR. AEROSOLUTIONS HAS CERTIFIED THAT ALL INSTRUCTIONS AND SPECIFICATIONS WERE COMPLETED AS LISTED ABOVE.

RECORD DRAWING

MONOPOLE REINFORCEMENT AND RETROFIT PROJECT
BU 876316; SECONDINO PROPERTY; BRANDFORD, CONNECTICUT

Revisions:	
Job No.	41708-0180
Date:	3-16-2009
Scale:	N.T.S.
Designed By:	U.Y.
Drawn By:	B.M.S.
Checked By:	
SHEET NO.	S-1

AeroSolutions LLC
Tower Upgrades and Maintenance
1906 13TH STREET, SUITE 200, BOULDER, COLORADO 80302
Tel: 702.304.6382 Fax: 702.304.6883 www.AeroSolutionsLLC.com

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street - Suite 1500 - Columbus, Ohio 43215
(614) 221-6679 www.pjfweb.com

People | Businesses | Assets | Licenses | Phones | Courts

PERSON

Last Name	First Name	Middle Name	SSN
BERNS	VIVIAN	G	

Street Address	City	State	Zip	County	Radius	Reference Code:
						00030.0001

Phone	DOB	Age Range
		-

☐ Search for other possible name spellings ☐ Include Bankruptcies

Output Type: ◉ Formatted HTML ○ Cut and Paste / Printer Friendly Text (No Reports)

Important: The Public Records and commercially available data sources used in this system have errors. Data is sometimes entered poorly, processed incorrectly and is generally not free from defect. This system should not be relied upon as definitively accurate. Before relying on any data this system supplies, it should be independently verified. For Secretary of State documents, the following data is for information purposes only and is not an official record. Certified copies may be obtained from that individual state's Department of State.

Search completed

Records: 1 to 5 of 5

SEARCH: Last Name: BERNS First Name: VIVIAN Middle Name: G

Edit Search | New S

Click Icons Below To Run a Report

Click Below for Next Steps

All	Full Name	SSN	Address	Phone Information
D	VIVIAN G BERNS045-14-xxxx Gender: Female DOB: 05/xx/1924 (72)		Jan 97	• Relatives • Associates • People at Work
D	VIVIAN G BERNS045-14-xxxx Gender: Female DOB: 05/xx/1924 (72)		15 WILCOX LN AVON CT 06001-2709	• Relatives • Neighbors • Associates • Relatives, Neighbors & Associates • People at Work
	VIVIAN G BERNS Gender: Female DOB: 05/xx/1924 (84)		29 COBBS RD WEST HARTFORD CT 06107-1402	• Relatives • Neighbors • Associates • Relatives, Neighbors & Associates
	VIVIAN G BERNS045-14-xxxx Gender: Female DOB: 1887 (122)		29 COBBS RD WEST HARTFORD CT 06107-1402	• Relatives • Neighbors • Associates • Relatives, Neighbors & Associates • People at Work
D	VIVIAN G BERNS045-14-xxxx Gender: Female DOB:		29 COBBS RD WEST HARTFORD CT 06107-1402	• Relatives • Neighbors • Associates

05/xx/1924 (72)

- Relatives, Neighbors & Associates
- People at Work

Export to Excel

Records: 1 to 5 of 5

SEARCH: Last Name: BERNS First Name: VIVIAN Middle Name: G

Your DPPA Permissible Use: Civil, Criminal, Administrative or Arbitral Proceedings

Your GLBA Permissible Use: Persons Holding a Legal or Beneficial Interest Relating to the Consumer

Edit Search | New S

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215-3708

March 16, 2009

Modified Structure is Adequate
Modified Monopole is Adequate
Existing Foundation is Adequate

Tom Warchol
Crown Castle International
5500 Flatiron Parkway
Suite 100
Boulder, CO 80301
570-455-7736

Subject: Post Construction Structural Analysis Report of Existing 147-Ft Monopole

Carrier Designation	**Verizon Wireless Co-Locate**	
	Carrier Site Number:	**TBD**
	Carrier Site Name:	**Branford 3, CT**
Crown Castle Designation	**Crown Castle BU Number:**	**876316**
	Crown Castle Site Name:	**Secondino Property**
Engineering Firm Designation	**Paul J. Ford and Company**	**41708-0180_RP**
Site Data	**21 Acorn Road, Branford, New Haven County, CT** **Latitude 41° 17' 35.06", Longitude -72° 45' 46.4"**	

Dear Tom Warchol,

Paul J. Ford and Company is pleased to submit this "Post Construction Structural Analysis Report" to determine the structural adequacy of the above monopole. This analysis has been performed in accordance with the Crown Castle Structural "Statement of Work", the terms of the Purchase Order, and the TIA/EIA-222-F Standard for the following Basic Wind Speeds: 85 mph without ice, 74 mph with 0.5" radial ice, and 50 mph (Operational) without ice.

The reinforced monopole was analyzed with the addition of the proposed antenna loading shown in the table below combined with the existing and reserved loading on the structure:

Elevation - ft	Count	Antenna Description
116	2	Antel LPA-80063/6CF w/ Mount Pipe
	2	ADC DUAL BAND 800/1900 FULL BAND

Based on our analysis, we have determined that the existing monopole structure as modified according to the attached drawing and the existing foundation will have sufficient capacity to support the existing, reserved, and proposed loading. Structural capacity of the monopole is less than 98%.

Respectfully submitted,

Udaykiran Yerra
Structural Engineer
uyerra@pjfweb.com

STATE OF CONNECTICUT
JOSEPH RAGNAR JACOBS
No. PEN 22731
LICENSED
PROFESSIONAL ENGINEER

MAR 16 2009

TABLE OF CONTENTS

INTRODUCTION

At the request of Crown Castle International, Paul J. Ford and Company has analyzed the reinforced monopole at the Secondino Property site located in Branford, New Haven County, CT. This structural analysis has been performed in accordance with the TIA/EIA-222-F-1996 Standard, "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures" to determine if the monopole structure has adequate capacity to support the existing, reserved, and proposed antenna loading.

ANALYSIS CRITERIA

The reinforced monopole has been analyzed for the antenna and coax loading listed in Tables 1A, 2A, and 2B below. The monopole has been analyzed in accordance with the TIA/EIA-222-F-1996 Standard for the following fastest-mile Basic Wind Speeds: 85 mph without ice, 74 with 0.5" radial ice, and 50 mph without ice as recommended for New Haven County, CT.

Table 1A - Proposed Antenna Information

Elevation - ft	Count	Antenna Description	Status
116	2	Antel LPA-80063/6CF w/ Mount Pipe	Proposed
	2	ADC DUAL BAND 800/1900 FULL BAND	Proposed

Table 2A - Existing and Reserved Antenna Information

Elevation - ft	Count	Antenna Description	Status
147	1	12' Low Profile Platform	Existing
145*	9	FV65-14-00NA2 w/Mount Pipe	MLA
137	1	12' T-Arm Mounts	Reserved
	3	Kathrein 742-213 w/Mount Pipe	Reserved
132	12	FR90-12-00DAL2 w/Mount Pipe	Existing
130	1	12' Low Profile Platform	Existing
116	6	Antel LPA-185090/8CFx2 w/ mount pipe	Existing
	4	DB844H80-XY w/Mount Pipe	Existing
	1	12' Low Profile Platform	Existing
108	9	Powerwave Technologies 7770 w/ Mount Pipe	Existing
	12	Powerwave Technologies LGP2140X	Existing
105	1	12' Low Profile Platform	Existing
81	2	KS24019-L112A	Existing
	1	Kathrein OG-860/1920/GPS-A	Existing
80	3	3' Side Arm Mount	Existing

* The MLA loading controls the analysis. The existing loading consists of: (4) FV65-14-00NA2 and (2) LPD-7907/4x3.

Table 2B - Existing and Reserved Cable Information

Elevation - ft	Count	Cable Description	Location	Status
147 – 0*	9	(1-5/8 FOAM)	Internal	MLA
137 - 0	6	(1-5/8 FOAM)	External	Reserved
130 - 0	12	(1-1/4 FOAM)	Internal	Existing
116 - 0	12	(1-5/8 FOAM)	Internal	Existing
105 - 0	12	(1-5/8 FOAM)	Internal	SLA
80 - 0	3	(1/2 FOAM)	Internal	Existing

*The MLA coax loading controls and was used in this analysis. The existing coax loading consists of: (6) 1-5/8" coax.
**SLA loading controls over existing (9) 1-1/4" coax loading.

Information for the existing monopole and foundation is based on the available drawings, documents, and/or information listed in Table 3 below.

Table 3 - Reference Documents Provided

Document	Source	Reference	Remarks
Proposed Antenna Loading	Crown Castle	876316	CCI
Existing Antenna Loading	Crown Castle	876316	CCI
Original Tower Drawings	Crown Castle	1632399	Summit Manufacturing Inc., 29297-566, 09-29-1997
Foundation Drawings	Crown Castle	1632435	Summit Manufacturing Inc., 29297-566, 09-29-1997
Geotechnical Report	Crown Castle	1529736	Dr. Clarence Welti, P.E., Geotchnical Engineering, 12-16-1996
Structural Analysis	Crown Castle	2223600	Tower Engineering Profesionals, 080368, 03-04-2008
Record Drawings	Crown Castle		PJF, 41708-0180, 3/16/2009

ANALYSIS PROCEDURE

ANALYSIS METHODS

RISA Tower (Version 5.1.2.0), a commercially available software program, was used to create a three-dimensional model of the monopole and calculate member stresses for various dead, live, wind, and ice load cases. The analysis was performed in accordance with the TIA/EIA-222-F Standard. Selected output from the analysis is included in Appendix A.

ASSUMPTIONS

1. Monopole was fabricated and installed in accordance with the manufacturer's specifications.
2. Monopole has been properly maintained in accordance with manufacturer's specifications.
3. The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1A, 2A, and 2B and the referenced drawings.
4. Monopole is reinforced in accordance with the Paul J. Ford & Company record drawings, PJF# 41708-0180, dated 3/16/2009.

If any of the above assumptions are not valid or have been made in error, then the results of this analysis may be affected. In that case, please notify Paul J. Ford and Company immediately so that we can review any new and/or modified information and determine its affect on the analysis results regarding the structural adequacy of the monopole and foundation.

ANALYSIS RESULTS

Our structural analysis indicates that the reinforced monopole structure and existing foundation have sufficient capacity to adequately support the existing, reserved, and proposed loading.

Table 4 - Component Stresses vs. Capacity (for Reinforced Condition)

Notes	Component	Elevation ft	% Capacity	Pass / Fail
Risa Tower Analysis Summary:				
	L1	147 - 105	69.3	Pass
	L2	105 - 90	98.0	Pass
	L3	90 - 73.75	81.7	Pass
	L4	73.75 - 42.75	87.2	Pass
	L5	42.75 - 0	97.5	Pass
Additional Components:				
	Base Plate	0 - 0	54	Pass
	Anchor Rods	0 - 0	97.9	Pass
	Foundation (Soil) - PJF Pole	0 - 0	96.2	Pass
	Foundation (Structural) - PJF Pole	0 - 0	56.5	Pass
			Structural Rating (maximum capacity of all components) =	93.6

As summarized in Table 4 above, our structural analysis indicates that the existing monopole structure as modified according to the attached drawing and the existing foundation have sufficient capacity to adequately support the existing, reserved and proposed loading.

APPENDIX A

Output From Computer Programs

Tower Input Data

There is a pole section.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Tower is located in New Haven County, Connecticut.
Basic wind speed of 85 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 74 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	√ Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Calculate Redundant Bracing Forces
Use Moment Magnification	√ Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
√ Use Code Stress Ratios	Use Clear Spans For KL/r	SR Leg Bolts Resist Compression
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	All Leg Panels Have Same Allowable
Escalate Ice	√ Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	√ Use Azimuth Dish Coefficients	√ Consider Feedline Torque
Use Special Wind Profile	√ Project Wind Area of Appurt.	Include Angle Block Shear Check
Include Bolts In Member Capacity	√ Autocalc Torque Arm Areas	**Poles**
Leg Bolts Are At Top Of Section	SR Members Have Cut Ends	√ Include Shear-Torsion Interaction
Secondary Horizontal Braces Leg	Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
Add IBC .6D+W Combination		

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	147.00-105.00	42.00	3.75	18	22.0000	29.1410	0.2500	1.0000	A607-60 (60 ksi)
L2	105.00-88.00	20.75	0.00	18	28.0034	31.2560	0.3125	1.2500	A607-60 (60 ksi)
L3	88.00-76.00	12.00	0.00	18	31.2560	33.2140	0.4446	1.7784	A607-60 (60 ksi)
L4	76.00-42.75	33.25	4.75	18	33.2140	38.6010	0.5240	2.0959	A607-60 (60 ksi)
L5	42.75-0.00	47.50		18	36.7835	45.1200	0.5604	2.2416	A607-60 (60 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/ft
L1	22.3394	17.2586	1031.4832	7.7212	11.1760	92.2945	2064.3237	8.6310	3.4320	13.728
	29.5905	22.9250	2417.5313	10.2563	14.8036	163.3067	4838.2436	11.4647	4.6888	18.755
L2	29.0323	27.4659	2660.7625	9.8303	14.2257	187.0387	5325.0261	13.7356	4.3786	14.012
	31.7382	30.6921	3712.8098	10.9849	15.8780	233.8329	7430.5050	15.3490	4.9511	15.843
L3	31.7382	43.4798	5214.9257	10.9380	15.8780	328.4362	10436.713 4	21.7440	4.7186	10.613
	33.7264	46.2429	6273.6358	11.6331	16.8727	371.8214	12555.526 5	23.1258	5.0632	11.388
L4	33.7264	54.3676	7340.1984	11.6050	16.8727	435.0337	14690.055 2	27.1890	4.9235	9.396
	39.1965	63.3268	11599.816 5	13.5173	19.6093	591.5464	23214.896 3	31.6694	5.8716	11.206
L5	38.1974	64.4312	10680.801 3	12.8592	18.6860	571.5938	21375.656 8	32.2217	5.4876	9.792
	45.8160	79.2597	19882.560 7	15.8187	22.9210	867.4401	39791.283 3	39.6374	6.9548	12.41

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_r	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 147.00-105.00				1	1	1		
L2 105.00-88.00				1	1	1		
L3 88.00-76.00				1	1	1		
L4 76.00-42.75				1	1	1		
L5 42.75-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
(1-5/8 FOAM)	C	No	Inside Pole	147.00 - 0.00	9	No Ice	0.00	0.82
**						1/2" Ice	0.00	0.82
(1-5/8 FOAM)	C	No	CaAa (Out Of Face)	137.00 - 90.00	1	No Ice	0.20	0.82
						1/2" Ice	0.30	2.33
(1-5/8 FOAM)	C	No	CaAa (Out Of Face)	90.00 - 0.00	1	No Ice	0.00	0.82
						1/2" Ice	0.00	2.33
(1-5/8 FOAM)	C	No	CaAa (Out Of Face)	137.00 - 0.00	5	No Ice	0.00	0.82
***						1/2" Ice	0.00	2.33
(1-1/4 FOAM)	C	No	Inside Pole	130.00 - 0.00	12	No Ice	0.00	0.66
**						1/2" Ice	0.00	0.66
(1-5/8 FOAM)	C	No	Inside Pole	116.00 - 0.00	12	No Ice	0.00	0.82
**						1/2" Ice	0.00	0.82
(1-5/8 FOAM)	C	No	Inside Pole	105.00 - 0.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
**								
(1/2 FOAM)	C	No	Inside Pole	80.00 - 0.00	3	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
**								
Aero MP3-05	C	No	CaAa (Out Of Face)	90.00 - 0.00	1	No Ice	0.35	0.00
						1/2" Ice	0.40	0.00

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	147.00-105.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	6.336	0.77
L2	105.00-88.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	3.666	0.68
L3	88.00-76.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	4.174	0.48
L4	76.00-42.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	11.564	1.34
L5	42.75-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	14.868	1.72

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	147.00-105.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	9.536	1.06
L2	105.00-88.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	5.270	0.83
L3	88.00-76.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	4.801	0.59
L4	76.00-42.75	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	13.303	1.64
L5	42.75-0.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	17.103	2.11

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	147.00-105.00	-0.1891	0.1092	-0.2660	0.1536
L2	105.00-88.00	-0.2586	0.1493	-0.3484	0.2011

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L3	88.00-76.00	-0.4000	0.2309	-0.4405	0.2543
L4	76.00-42.75	-0.4048	0.2337	-0.4474	0.2583
L5	42.75-0.00	-0.4104	0.2369	-0.4558	0.2632

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(3) FV65-14-00NA2 w/Mount Pipe	A	From Face	3.00 0.00 0.00	0.0000	145.00	No Ice 1/2" Ice	8.64 9.29	6.95 8.13	0.06 0.12
(3) FV65-14-00NA2 w/Mount Pipe	B	From Face	3.00 0.00 0.00	0.0000	145.00	No Ice 1/2" Ice	8.64 9.29	6.95 8.13	0.06 0.12
(3) FV65-14-00NA2 w/Mount Pipe	C	From Face	3.00 0.00 0.00	0.0000	145.00	No Ice 1/2" Ice	8.64 9.29	6.95 8.13	0.06 0.12
12' Low Profile Platform	C	None		0.0000	147.00	No Ice 1/2" Ice	27.00 32.00	27.00 32.00	1.10 1.70
**									
12' T-Arm Mounts	C	None		0.0000	137.00	No Ice 1/2" Ice	12.00 18.00	12.00 18.00	1.14 1.27
Kathrein 742-213 w/Mount Pipe	A	From Face	0.50 0.00 0.00	0.0000	137.00	No Ice 1/2" Ice	5.14 5.61	2.96 3.63	0.02 0.05
Kathrein 742-213 w/Mount Pipe	B	From Face	0.50 0.00 0.00	0.0000	137.00	No Ice 1/2" Ice	5.14 5.61	2.96 3.63	0.02 0.05
Kathrein 742-213 w/Mount Pipe	C	From Face	0.50 0.00 0.00	0.0000	137.00	No Ice 1/2" Ice	5.14 5.61	2.96 3.63	0.02 0.05
**									
(4) FR90-12-00DAL2 w/Mount Pipe	A	From Face	3.00 0.00 0.00	0.0000	132.00	No Ice 1/2" Ice	8.64 9.29	6.95 8.13	0.06 0.12
(4) FR90-12-00DAL2 w/Mount Pipe	B	From Face	3.00 0.00 0.00	0.0000	132.00	No Ice 1/2" Ice	8.64 9.29	6.95 8.13	0.06 0.12
(4) FR90-12-00DAL2 w/Mount Pipe	C	From Face	3.00 0.00 0.00	0.0000	132.00	No Ice 1/2" Ice	8.64 9.29	6.95 8.13	0.06 0.12
12' Low Profile Platform	C	None		0.0000	130.00	No Ice 1/2" Ice	27.00 32.00	27.00 32.00	1.10 1.70
**									
(2) Antel LPA-185090/8CFx2 w/ mount pipe	A	From Face	3.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice	2.20 2.52	3.78 4.36	0.02 0.05
(2) Antel LPA-185090/8CFx2 w/ mount pipe	C	From Face	3.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice	2.20 2.52	3.78 4.36	0.02 0.05
(2) DB844H80-XY w/Mount Pipe	A	From Face	3.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice	3.58 4.20	5.63 6.73	0.04 0.08

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* ft ft ft	*Azimuth Adjustment* °	*Placement* ft		C_AA_A *Front* ft^2	C_AA_A *Side* ft^2	*Weight* K
(2) DB844H80-XY w/Mount Pipe	C	From Face	3.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice	3.58 4.20	5.63 6.73	0.04 0.08
(2) Antel LPA-80063/6CF w/ Mount Pipe	B	From Face	3.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice	10.68 11.31	11.41 12.38	0.08 0.18
(2) Antel LPA-185090/8CFx2 w/ mount pipe	B	From Face	3.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice	2.20 2.52	3.78 4.36	0.02 0.05
(2) ADC DUAL BAND 800/1900 FULL BAND	B	From Face	3.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice	0.65 0.76	0.81 0.94	0.03 0.04
12' Low Profile Platform	C	None		0.0000	116.00	No Ice 1/2" Ice	27.00 32.00	27.00 32.00	1.10 1.70
**									
(3) Powerwave Technologies 7770 w/ Mount Pipe	A	From Face	3.00 0.00 0.00	0.0000	108.00	No Ice 1/2" Ice	6.01 6.46	4.42 5.08	0.07 0.12
(3) Powerwave Technologies 7770 w/ Mount Pipe	B	From Face	3.00 0.00 0.00	0.0000	108.00	No Ice 1/2" Ice	6.01 6.46	4.42 5.08	0.07 0.12
(3) Powerwave Technologies 7770 w/ Mount Pipe	C	From Face	3.00 0.00 0.00	0.0000	108.00	No Ice 1/2" Ice	6.01 6.46	4.42 5.08	0.07 0.12
(4) Powerwave Technologies LGP2140X	A	From Face	3.00 0.00 0.00	0.0000	108.00	No Ice 1/2" Ice	1.23 1.38	0.37 0.48	0.02 0.02
(4) Powerwave Technologies LGP2140X	B	From Face	3.00 0.00 0.00	0.0000	108.00	No Ice 1/2" Ice	1.23 1.38	0.37 0.48	0.02 0.02
(4) Powerwave Technologies LGP2140X	C	From Face	3.00 0.00 0.00	0.0000	108.00	No Ice 1/2" Ice	1.23 1.38	0.37 0.48	0.02 0.02
12' Low Profile Platform	C	None		0.0000	105.00	No Ice 1/2" Ice	27.00 32.00	27.00 32.00	1.10 1.70
**									
KS24019-L112A	A	From Face	3.00 0.00 0.00	0.0000	81.00	No Ice 1/2" Ice	0.10 0.18	0.10 0.18	0.01 0.01
Kathrein OG-860/1920/GPS-A	B	From Face	3.00 0.00 0.00	0.0000	81.00	No Ice 1/2" Ice	0.14 0.23	0.14 0.23	0.00 0.00
KS24019-L112A	C	From Face	3.00 0.00 0.00	0.0000	81.00	No Ice 1/2" Ice	0.10 0.18	0.10 0.18	0.01 0.01
3' Side Arm Mount	A	None		0.0000	80.00	No Ice 1/2" Ice	0.76 0.96	0.76 0.96	0.03 0.04
3' Side Arm Mount	B	None		0.0000	80.00	No Ice 1/2" Ice	0.76 0.96	0.76 0.96	0.03 0.04
3' Side Arm Mount	C	None		0.0000	80.00	No Ice 1/2" Ice	0.76 0.96	0.76 0.96	0.03 0.04

Tower Pressures - No Ice

G_H = 1.690

Section Elevation ft	z ft	K_z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 147.00-105.00	125.27	1.464	27	89.497	A	0.000	89.497	89.497	100.00	0.000	0.000
					B	0.000	89.497		100.00	0.000	0.000
					C	0.000	89.497		100.00	0.000	6.336
L2 105.00-88.00	96.37	1.358	25	42.392	A	0.000	42.392	42.392	100.00	0.000	0.000
					B	0.000	42.392		100.00	0.000	0.000
					C	0.000	42.392		100.00	0.000	3.666
L3 88.00-76.00	81.94	1.297	24	32.235	A	0.000	32.235	32.235	100.00	0.000	0.000
					B	0.000	32.235		100.00	0.000	0.000
					C	0.000	32.235		100.00	0.000	4.174
L4 76.00-42.75	59.29	1.182	22	99.494	A	0.000	99.494	99.494	100.00	0.000	0.000
					B	0.000	99.494		100.00	0.000	0.000
					C	0.000	99.494		100.00	0.000	11.564
L5 42.75-0.00	20.73	1	18	147.375	A	0.000	147.375	147.375	100.00	0.000	0.000
					B	0.000	147.375		100.00	0.000	0.000
					C	0.000	147.375		100.00	0.000	14.868

Tower Pressure - With Ice

G_H = 1.690

Section Elevation ft	z ft	K_z	q_z psf	t_z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 147.00-105.00	125.27	1.464	20	0.5000	92.997	A	0.000	92.997	92.997	100.00	0.000	0.000
						B	0.000	92.997		100.00	0.000	0.000
						C	0.000	92.997		100.00	0.000	9.536
L2 105.00-88.00	96.37	1.358	19	0.5000	43.808	A	0.000	43.808	43.808	100.00	0.000	0.000
						B	0.000	43.808		100.00	0.000	0.000
						C	0.000	43.808		100.00	0.000	5.270
L3 88.00-76.00	81.94	1.297	18	0.5000	33.235	A	0.000	33.235	33.235	100.00	0.000	0.000
						B	0.000	33.235		100.00	0.000	0.000
						C	0.000	33.235		100.00	0.000	4.801
L4 76.00-42.75	59.29	1.182	16	0.5000	102.265	A	0.000	102.265	102.265	100.00	0.000	0.000
						B	0.000	102.265		100.00	0.000	0.000
						C	0.000	102.265		100.00	0.000	13.303
L5 42.75-0.00	20.73	1	14	0.5000	150.938	A	0.000	150.938	150.938	100.00	0.000	0.000
						B	0.000	150.938		100.00	0.000	0.000
						C	0.000	150.938		100.00	0.000	17.103

Tower Pressure - Service

G_H = 1.690

Section Elevation ft	z ft	K_z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 147.00-105.00	125.27	1.464	9	89.497	A	0.000	89.497	89.497	100.00	0.000	0.000
					B	0.000	89.497		100.00	0.000	0.000
					C	0.000	89.497		100.00	0.000	6.336

Section Elevation ft	z ft	K_z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L2 105.00-88.00	96.37	1.358	9	42.392	A	0.000	42.392	42.392	100.00	0.000	0.000
					B	0.000	42.392		100.00	0.000	0.000
					C	0.000	42.392		100.00	0.000	3.666
L3 88.00-76.00	81.94	1.297	8	32.235	A	0.000	32.235	32.235	100.00	0.000	0.000
					B	0.000	32.235		100.00	0.000	0.000
					C	0.000	32.235		100.00	0.000	4.174
L4 76.00-42.75	59.29	1.182	8	99.494	A	0.000	99.494	99.494	100.00	0.000	0.000
					B	0.000	99.494		100.00	0.000	0.000
					C	0.000	99.494		100.00	0.000	11.564
L5 42.75-0.00	20.73	1	6	147.375	A	0.000	147.375	147.375	100.00	0.000	0.000
					B	0.000	147.375		100.00	0.000	0.000
					C	0.000	147.375		100.00	0.000	14.868

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 90 deg - No Ice
4	Dead+Wind 180 deg - No Ice
5	Dead+Ice+Temp
6	Dead+Wind 0 deg+Ice+Temp
7	Dead+Wind 90 deg+Ice+Temp
8	Dead+Wind 180 deg+Ice+Temp
9	Dead+Wind 0 deg - Service
10	Dead+Wind 90 deg - Service
11	Dead+Wind 180 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	147 - 105	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	5	-14.29	-0.63	0.36
			Max. Mx	3	-7.78	-427.70	0.50
			Max. My	2	-7.79	-0.60	427.16
			Max. Vy	3	18.77	-427.70	0.50
			Max. Vx	2	-18.72	-0.60	427.16
			Max. Torque	4			2.05
L2	105 - 88	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	5	-21.06	-0.33	0.19
			Max. Mx	3	-12.81	-907.18	1.44
			Max. My	2	-12.81	-1.52	905.58
			Max. Vy	3	24.25	-907.18	1.44
			Max. Vx	2	-24.19	-1.52	905.58
			Max. Torque	4			2.03
L3	88 - 76	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	5	-23.86	-0.12	0.07
			Max. Mx	3	-15.41	-1204.57	1.96
			Max. My	2	-15.42	-2.02	1202.36
			Max. Vy	3	25.38	-1204.57	1.96
			Max. Vx	2	-25.33	-2.02	1202.36
			Max. Torque	4			2.00
L4	76 - 42.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	5	-31.55	0.39	-0.23
			Max. Mx	3	-22.72	-1960.74	3.21
			Max. My	2	-22.72	-3.20	1957.09

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L5	42.75 - 0	Pole	Max. Vy	3	27.67	-1960.74	3.21
			Max. Vx	2	-27.62	-3.20	1957.09
			Max. Torque	4			1.97
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	5	-47.74	1.37	-0.79
			Max. Mx	3	-38.33	-3348.10	5.19
			Max. My	4	-38.33	5.77	-3342.43
			Max. Vy	3	30.63	-3348.10	5.19
			Max. Vx	2	-30.58	-5.04	3342.12
			Max. Torque	4			1.87

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	5	47.74	0.00	-0.00
	Max. H_x	4	38.36	0.05	-30.55
	Max. H_z	2	38.36	-0.05	30.55
	Max. M_x	2	3342.12	-0.05	30.55
	Max. M_z	3	3348.10	-30.60	0.05
	Max. Torsion	4	1.75	0.05	-30.55
	Min. Vert	3	38.36	-30.60	0.05
	Min. H_x	3	38.36	-30.60	0.05
	Min. H_z	4	38.36	0.05	-30.55
	Min. M_x	4	-3342.43	0.05	-30.55
	Min. M_z	8	-5.94	0.04	-25.56
	Min. Torsion	2	-1.75	-0.05	30.55

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	38.36	0.00	0.00	0.20	0.35	0.00
Dead+Wind 0 deg - No Ice	38.36	0.05	-30.55	-3342.12	-5.04	1.75
Dead+Wind 90 deg - No Ice	38.36	30.60	-0.05	-5.19	-3348.10	-1.01
Dead+Wind 180 deg - No Ice	38.36	-0.05	30.55	3342.43	5.77	-1.75
Dead+Ice+Temp	47.74	-0.00	0.00	0.79	1.37	0.00
Dead+Wind 0 deg+Ice+Temp	47.74	0.04	-25.56	-2875.05	-3.10	1.24
Dead+Wind 90 deg+Ice+Temp	47.74	25.61	-0.04	-3.70	-2879.66	-0.72
Dead+Wind 180 deg+Ice+Temp	47.74	-0.04	25.56	2876.68	5.94	-1.24
Dead+Wind 0 deg - Service	38.36	0.02	-10.57	-1158.15	-1.53	0.61
Dead+Wind 90 deg - Service	38.36	10.59	-0.02	-1.67	-1159.99	-0.35
Dead+Wind 180 deg - Service	38.36	-0.02	10.57	1158.55	2.22	-0.61

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-38.36	0.00	0.00	38.36	0.00	0.000%
2	0.05	-38.36	-30.55	-0.05	38.36	30.55	0.001%
3	30.60	-38.36	-0.05	-30.60	38.36	0.05	0.002%
4	-0.05	-38.36	30.55	0.05	38.36	-30.55	0.002%
5	0.00	-47.74	0.00	0.00	47.74	-0.00	0.000%
6	0.04	-47.74	-25.56	-0.04	47.74	25.56	0.000%
7	25.61	-47.74	-0.04	-25.61	47.74	0.04	0.000%
8	-0.04	-47.74	25.56	0.04	47.74	-25.56	0.000%
9	0.02	-38.36	-10.57	-0.02	38.36	10.57	0.003%
10	10.59	-38.36	-0.02	-10.59	38.36	0.02	0.007%
11	-0.02	-38.36	10.57	0.02	38.36	-10.57	0.003%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	16	0.00000001	0.00006588
3	Yes	15	0.00002410	0.00009793
4	Yes	15	0.00002411	0.00012968
5	Yes	6	0.00000001	0.00000001
6	Yes	17	0.00000001	0.00010988
7	Yes	17	0.00000001	0.00010799
8	Yes	17	0.00000001	0.00010897
9	Yes	14	0.00006291	0.00007233
10	Yes	13	0.00014728	0.00012535
11	Yes	14	0.00006290	0.00006976

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	147 - 105	38.150	10	2.2174	0.0045
L2	108.75 - 88	21.193	10	1.8903	0.0036
L3	88 - 76	13.724	10	1.4950	0.0020
L4	76 - 42.75	10.236	10	1.2771	0.0015
L5	47.5 - 0	4.052	10	0.7879	-0.0007

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
147.00	12' Low Profile Platform	10	38.150	2.2174	0.0045	26953
145.00	(3) FV65-14-00NA2 w/Mount Pipe	10	37.220	2.2077	0.0044	26953
137.00	12' T-Arm Mounts	10	33.514	2.1668	0.0044	13476
132.00	(4) FR90-12-00DAL2 w/Mount Pipe	10	31.224	2.1367	0.0044	8984
130.00	12' Low Profile Platform	10	30.317	2.1232	0.0043	7927
116.00	(2) Antel LPA-185090/8CFx2 w/ mount pipe	10	24.176	1.9922	0.0040	4346

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
108.00	(3) Powerwave Technologies 7770 w/ Mount Pipe	10	20.894	1.8781	0.0035	3488
105.00	12' Low Profile Platform	10	19.718	1.8264	0.0033	3298
81.00	KS24019-L112A	10	11.622	1.3675	0.0017	3172
80.00	3' Side Arm Mount	10	11.337	1.3496	0.0017	3283

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	147 - 105	109.816	3	6.3860	0.0128
L2	108.75 - 88	61.060	3	5.4457	0.0103
L3	88 - 76	39.562	3	4.3092	0.0058
L4	76 - 42.75	29.515	3	3.6821	0.0043
L5	47.5 - 0	11.689	3	2.2726	0.0020

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
147.00	12' Low Profile Platform	3	109.816	6.3860	0.0128	9576
145.00	(3) FV65-14-00NA2 w/Mount Pipe	3	107.143	6.3581	0.0128	9576
137.00	12' T-Arm Mounts	3	96.490	6.2396	0.0127	4787
132.00	(4) FR90-12-00DAL2 w/Mount Pipe	3	89.906	6.1527	0.0126	3190
130.00	12' Low Profile Platform	3	87.298	6.1137	0.0125	2814
116.00	(2) Antel LPA-185090/8CFx2 w/ mount pipe	3	69.639	5.7375	0.0114	1540
108.00	(3) Powerwave Technologies 7770 w/ Mount Pipe	3	60.200	5.4108	0.0101	1234
105.00	12' Low Profile Platform	3	56.817	5.2628	0.0095	1165
81.00	KS24019-L112A	3	33.506	3.9385	0.0048	1112
80.00	3' Side Arm Mount	3	32.688	3.8871	0.0047	1150

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	147 - 105 (1)	TP29.141x22x0.25	42.00	0.00	0.0	36.000	22.4191	-7.78	807.09	0.010
L2	105 - 88 (2)	TP31.256x28.0034x0.3125	20.75	0.00	0.0	36.000	30.6921	-12.81	1104.92	0.012
L3	88 - 76 (3)	TP33.214x31.256x0.4446	12.00	0.00	0.0	36.000	46.2429	-15.41	1664.74	0.009
L4	76 - 42.75 (4)	TP38.601x33.214x0.524	33.25	0.00	0.0	36.000	62.0470	-22.72	2233.69	0.010
L5	42.75 - 0 (5)	TP45.12x36.7835x0.5604	47.50	0.00	0.0	36.000	79.2597	-38.33	2853.35	0.013

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	147 - 105 (1)	TP29.141x22x0.25	427.70	32.869	36.000	0.913	0.00	0.000	36.000	0.000
L2	105 - 88 (2)	TP31.256x28.0034x0.3125	907.18	46.556	36.000	1.293	0.00	0.000	36.000	0.000
L3	88 - 76 (3)	TP33.214x31.256x0.4446	1204.57	38.876	36.000	1.080	0.00	0.000	36.000	0.000
L4	76 - 42.75 (4)	TP38.601x33.214x0.524	1960.74	41.445	36.000	1.151	0.00	0.000	36.000	0.000
L5	42.75 - 0 (5)	TP45.12x36.7835x0.5604	3348.11	46.317	36.000	1.287	0.00	0.000	36.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	147 - 105 (1)	TP29.141x22x0.25	18.77	0.837	24.000	0.070	1.18	0.044	24.000	0.002
L2	105 - 88 (2)	TP31.256x28.0034x0.3125	24.25	0.790	24.000	0.066	1.15	0.029	24.000	0.001
L3	88 - 76 (3)	TP33.214x31.256x0.4446	25.38	0.549	24.000	0.046	1.14	0.018	24.000	0.001
L4	76 - 42.75 (4)	TP38.601x33.214x0.524	27.67	0.446	24.000	0.037	1.09	0.011	24.000	0.000
L5	42.75 - 0 (5)	TP45.12x36.7835x0.5604	30.63	0.386	24.000	0.032	1.01	0.007	24.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	147 - 105 (1)	0.010	0.913	0.000	0.070	0.002	0.924 ✓	1.333	H1-3+VT ✓
L2	105 - 88 (2)	0.012	1.293	0.000	0.066	0.001	1.306 ✓	1.333	H1-3+VT ✓
L3	88 - 76 (3)	0.009	1.080	0.000	0.046	0.001	1.090 ✓	1.333	H1-3+VT ✓
L4	76 - 42.75 (4)	0.010	1.151	0.000	0.037	0.000	1.162 ✓	1.333	H1-3+VT ✓
L5	42.75 - 0 (5)	0.013	1.287	0.000	0.032	0.000	1.300 ✓	1.333	H1-3+VT ✓

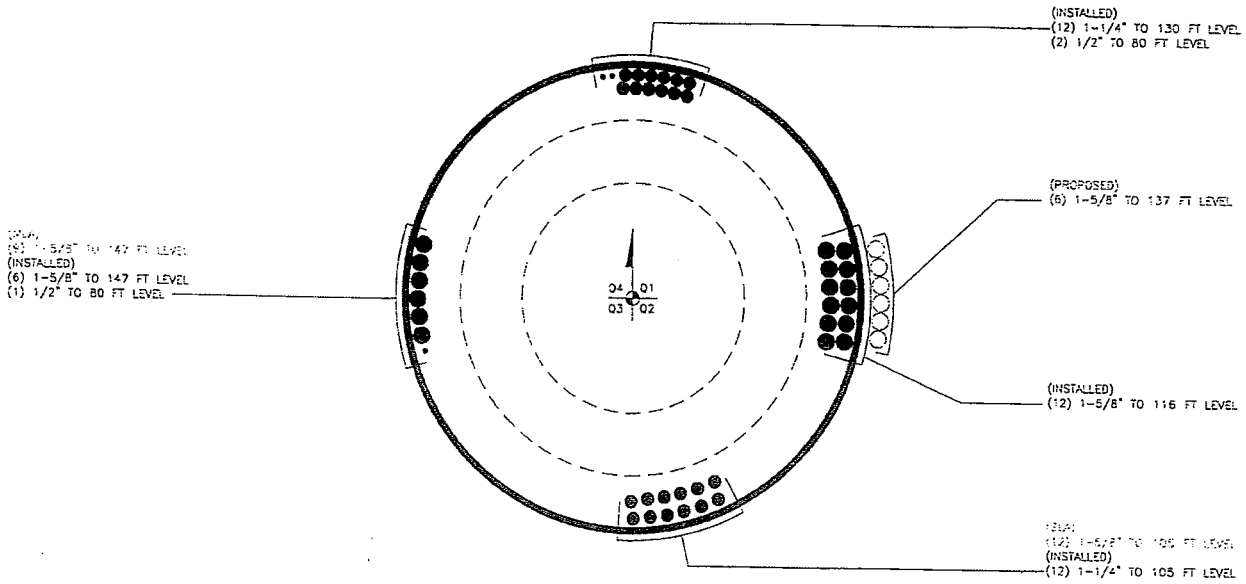
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	147 - 105	Pole	TP29.141x22x0.25	1	-7.78	1075.85	69.3	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L2	105 - 88	Pole	TP31.256x28.0034x0.3125	2	-12.81	1472.86	98.0	Pass
L3	88 - 76	Pole	TP33.214x31.256x0.4446	3	-15.41	2219.10	81.7	Pass
L4	76 - 42.75	Pole	TP38.601x33.214x0.524	4	-22.72	2977.51	87.2	Pass
L5	42.75 - 0	Pole	TP45.12x36.7835x0.5604	5	-38.33	3803.52	97.5	Pass
							Summary	
						Pole (L2)	98.0	Pass
						RATING =	**98.0**	**Pass**

APPENDIX B

Cable Routing Drawing

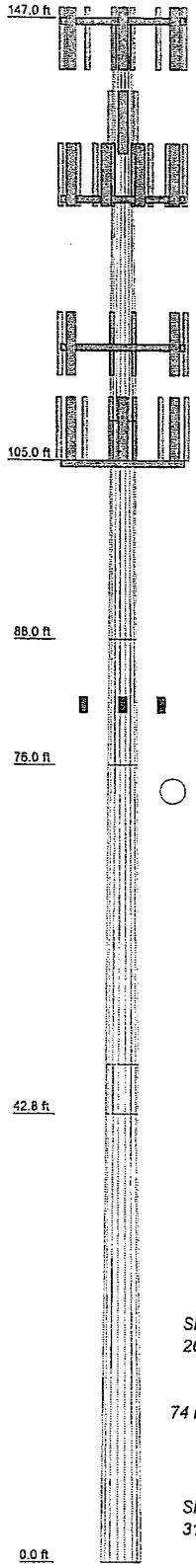


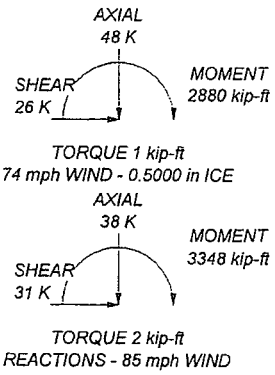
APPENDIX C

Table C1 - List of Attached Documents

Attachment
ERI Monopole Profile
Base Plate Calculations
Foundation Calculations
Record Drawings

Section	1	2	3	4	5
Length (ft)	42.00	20.75	12.00	33.25	47.50
Number of Sides	18	18	18	18	18
Thickness (in)	0.2500	0.3125	0.4446	0.5240	0.5604
Lap Splice (ft)	3.75			4.75	
Top Dia (in)	22.0000	28.0034	31.2560	33.2140	36.7835
Bot Dia (in)	28.1410	31.2560	33.2140	38.6010	45.1200
Grade	A607-60				
Weight (K) 25.0	2.9	2.1	1.0	6.7	11.6





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
12' Low Profile Platform	147	(2) ADC DUAL BAND 800/1900 FULL BAND	116
(3) FV65-14-00NA2 w/Mount Pipe	145	12' Low Profile Platform	116
(3) FV65-14-00NA2 w/Mount Pipe	145	(3) Powerwave Technologies 7770 w/ Mount Pipe	108
(3) FV65-14-00NA2 w/Mount Pipe	145	(3) Powerwave Technologies 7770 w/ Mount Pipe	108
12' T-Arm Mounts	137	(3) Powerwave Technologies 7770 w/ Mount Pipe	108
Kathrein 742-213 w/Mount Pipe	137	(4) Powerwave Technologies LGP2140X	108
Kathrein 742-213 w/Mount Pipe	137	(4) Powerwave Technologies LGP2140X	108
Kathrein 742-213 w/Mount Pipe	137	(4) Powerwave Technologies LGP2140X	108
(4) FR90-12-00DAL2 w/Mount Pipe	132	12' Low Profile Platform	105
(4) FR90-12-00DAL2 w/Mount Pipe	132	KS24019-L112A	81
(4) FR90-12-00DAL2 w/Mount Pipe	132	Kathrein OG-850/1920/GPS-A	81
12' Low Profile Platform	130	KS24019-L112A	81
(2) Antel LPA-185090/8CFx2 w/ mount pipe	116	3' Side Arm Mount	80
(2) Antel LPA-185090/8CFx2 w/ mount pipe	116	3' Side Arm Mount	80
(2) DB844H80-XY w/Mount Pipe	116	3' Side Arm Mount	80
(2) DB844H80-XY w/Mount Pipe	116		
(2) Antel LPA-80063/6CF w/ Mount Pipe	116		
(2) Antel LPA-185090/8CFx2 w/ mount pipe	116		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-60	60 ksi	75 ksi			

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 98%

Paul J Ford and Company
250 E. Broad Street Suite 1500
Columbus, OH 43215
Phone: 614.221.6679
FAX: 614.448.4105

Job: *Ex. 147 ft Monopole, Secondino, Property Branford, CT*			
Project: *PJF #37508-0592 R1/ BU #876316*			
Client: Crown Castle International	Drawn by: Udaykiran Yerra	App'd:	
Code: TIA/EIA-222-F	Date: 03/16/09	Scale: NTS	
Path:		Dwg No. E-1	

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215-3708
Phone 614-221-6679 • Fax 614-448-4105 • www.PJFweb.com

Date: 3/16/2009
PJF Project: A41708-0180
Client Ref. # BU876316
Site Name: Site Name
Description: Description
Owner: Owner
Engineer: Engineer

Version: 1.05 Date: 1-19-2009
No Stiffeners; CCI Methodology

Monopole Base Plate Analysis for Round/Square Unstiffened Base Plates

Reference Standard and Methodology:

Reference Standard:	TIA-222-F	Design Methodology:	CCI, 11/14/08
ASD Stress Increase:	1.3333	Base Plate Type:	Square/Unstiffened

Base Reactions from Analysis (ASD, TIA-222-F):

Moment:	3348.0 ft-kips	Elevation:	0.0 ft
Axial Load:	38.0 kips		

Shaft Parameters:

Shaft Shape; Number of Sides:	18	Shaft Steel Specification:	ASTM A572 GR 60
Diameter Across Flats:	45.12 inch	Shaft Yield Strength, Fy:	60 ksi
Shaft Thickness:	0.43750 inch	Base Connection Type:	Butt Weld

Base Plate Parameters:

Plate Type:	Square	Bolt Circle, BC:	52.00 inch
Plate Diameter or Width:	53.00 inch	Plate Steel Specification:	ASTM A572 GR 50
Plate Thickness:	3.000 inch	Plate Yield Strength, Fy:	50 ksi

Anchor Rod Parameters:

Number of Anchor Rods:	16	Anchor Rod Diameter:	2.250 inch
Anchor Rod Spacing:	Divided per 4 Corners	Anchor Rod Specification:	A615 #18J (Gr. 75)

Anchor Rod Analysis Results:

		Calculation reference, and/or controlling condition:
Moment of Inertia	5408.0 in²	0.125 Number of Anchors x Bolt Circle²
Anchor Rod Compression:	2.4 kips	Axial Load / Number of Anchors
Anchor Rod Tension from Moment:	193.2 kips	Moment x Max. Anchor Rod Distance / Moment of Inertia
Net Anchor Rod Compression:	195.5 kips	Anchor Tension + Anchor Compression
Net Anchor Rod Tension:	190.8 kips	Anchor Tension - Anchor Compression
Allowable Anchor Tension:	194.9 kips	0.6 x Anchor Fy x Anchor Net Area x Stress Increase
Actual/Allowable Load Ratio:	97.9% ✓	RESULTS: Within Allowable Limits: PASS

Base Plate Bending Analysis Results:

		Calculation reference, and/or controlling condition:
Bend Plane:	27.494 inch	Limiting 2-to-1 Projection Bend Plane Controls
Moment Arm, MA:	2.141 inch	CCI Face-of-Bolt Method Used
Plate Bending Moment:	1113.775 in-kips	∑ Net Anchor Compression x MA
Plate Section Modulus:	41.242 in³	Bend Plane x Thickness² / 6
Plate Bending Stress:	27.006 ksi	Bending Moment / Section Modulus
Allowable Bending Stress:	50.000 ksi	0.75 x Plate Fy x Stress Increase
Actual/Allowable Stress Ratio:	54.0% ✓	RESULTS: Within Allowable Limits: PASS

Analysis Summary:

Anchor Rods: 97.9% PASS **Base Plate: 54.0% PASS**

Job No.....: 37508-0592 Design No: BU# 876316 Engineer : DSK

PJF_Pole (tm) - Monopole Design Program. Status..... : Preliminary Design

S U M M A R Y O F C U R R E N T C A I S S O N D E S I G N

Diameter (ft) .....:	7.00	Compression (kips):	38.00	Friction S.F .....:	2.00
Min. Depth (ft) ...:	22.50	Horizontal (kips) :	31.00	Lateral S.F .....:	2.00
Depth Used (ft) ...:	22.50	Uplift (kips) ....:	0.00	Concrete S.F .....:	1.30
Rebar Area (in^2) .:	49.92	Moment (Ft-kips) .:	3348.0	Concrete F'c (psi) :	3000.0
Rebar Used .....:	(32)#11	Full Cohesion (ft):	21.00	Steel Cover (in) ..:	4.00
Water at (ft) .....:	5.00	Rock at (ft) .....:	26.00		

SOIL PROFILE :

Soil Layer	Layer Thickness (ft)	Unit Weight (pcf)	Ult. Skin Friction (psf)	Allowable Bearing (psf)	Friction Angle- Phi (deg)	Passive Coeff.- KP	Cohesion (c) (psf)
1	3.00	100.00	0.00	0.00	0.00	1.000	0.00
2	2.00	100.00	0.00	0.00	36.00	3.852	0.00
3	2.50	72.60	0.00	0.00	36.00	3.852	0.00
4	13.50	72.60	0.00	8000.00	40.00	4.599	0.00
5	5.00	72.60	0.00	8000.00	40.00	4.599	0.00

LATERAL / MOMENT CAPACITY (CHECK) :	Min Design	Actual Design
Caisson Diameter (ft) .....:	7.00	7.00
Height Above Grade (ft) .....:	0.50	0.50
Depth Below Grade (ft) .....:	22.50	22.50
Concrete Volume (CY) .....:	32.78	32.78
Applied Moment From Loads (Working), Mwork(Ft-kip):	3864.15	3864.15
Resisting Moment From Soil (Ult), Mult(Ft-kip) ...:	8023.24	8023.24
Moment S.F. (Mult / Mwork) .....:	2.08	2.08
Applied Horizontal Load (Working), Hwork (Kips) ..:	31.00	31.00
Horizontal Soil Resistance (Ultimate), Hult (Kips):	71.39	71.39
Horizontal S.F. (Hult / Hwork) .....:	2.30	2.30
Center of Rotation (from grade) (ft) .....:	16.15	16.15
Inflection Point (Max Design Moment Location (ft) :	5.20	5.20
Maximum Factored Design Moment for Reinf. (Ft-kip):	4854.14	4854.14
Area Steel Required From Loads (in^2) .....:	28.20	28.20
ACI Minimum Steel (0.5%) (in^2) .....:	27.71	27.71
Area Reinf. Steel Provided (in^2) .....:	49.92	49.92

UPLIFT CAPACITY CHECK :		
Actual Uplift on Caisson (Kips) .....:	0.00	0.00
Allowable Uplift Capacity (Kips) .....:	72.60	72.60

COMPRESSION CAPACITY CHECK :		
Actual Compression on Caisson (Kips) .....:	38.00	38.00
Total Compression (Includes Concrete Wt.) (Kips) .:	84.18	84.18
Allowable Compression Capacity (Kips) .....:	307.88	307.88

CAISSON DESIGN:

USE: 7.00 ft Diameter X 23.00 ft Long (Concrete Volume = 32.78 CY)

Reinf: (32)#11 Vert, w/Closed Ties: (14)#5 @6.0", remaining ties @18.0" (ASTM A615)

STATE OF CONNECTICUT

DEPARTMENT OF PUBLIC SAFETY
DIVISION OF FIRE, EMERGENCY AND BUILDING SERVICES
OFFICE OF THE STATE BUILDING INSPECTOR

August 27, 2007

Derek J. Creaser EIT
Hudson Design Group
46 Beechwood Drive
North Andover, MA 01845

Dear Mr. Creaser,

The following is offered in response to your August 22, 2007 letter to me in which you seek clarification of the correlation between Appendix K of the 2003 International Building Code portion of the 2005 State Building Code and the provisions of the TIA/EIA-222-F-96 standard for the design of towers.

Question: Is it the intent of the 2005 State Building Code to require the use of the Appendix K wind speeds when utilizing Exception 5 to Section 1609.1.1, which allows use of the TIA/EIA-222-F-96 standard?

Answer: No. The appropriate wind speeds to use when utilizing the TIA/EIA standard would be the wind speeds incorporated in the standard itself.

Regards,

Christopher R. Laux, A.I.A.
State Building Inspector

Telephone (860) 685-8310
1111 Country Club Road
Middletown, CT 06457
http://www.ct.gov/dps
An Equal Opportunity Employer

State of COLORADO

COUNTY	NOTE*	BASIC WIND SPEED (MPH)
LAS ANIMAS	1	80
LINCOLN		85
LOGAN		85
MESA		70
MINERAL		75
MOFFAT		80
MONTEZUMA		70
MONTROSE		70
MORGAN		85
OTERO		85
OURAY		70
PARK	1	80
PHILLIPS		85
PITKIN		80
PROWERS		85
PUEBLO		85
RIO BLANCO		75
RIO GRANDE		80
ROUTT		85
SAGUACHE	1	80
SAN JUAN		70
SAN MIGUEL		70
SEDGWICK		85
SUMMIT	1	80
TELLER	1	85
WASHINGTON		85
WELD		85
YUMA		85

State of CONNECTICUT

FAIRFIELD	2	85
HARTFORD	2	80
LITCHFIELD	1,2	80
MIDDLESEX	2	85
NEW HAVEN	2	85
NEW LONDON	2	85
TOLLAND	2	85
WINDHAM	2	85

State of DELAWARE

KENT	2	80
NEW CASTLE	2	75
SUSSEX	2	90

District of COLUMBIA

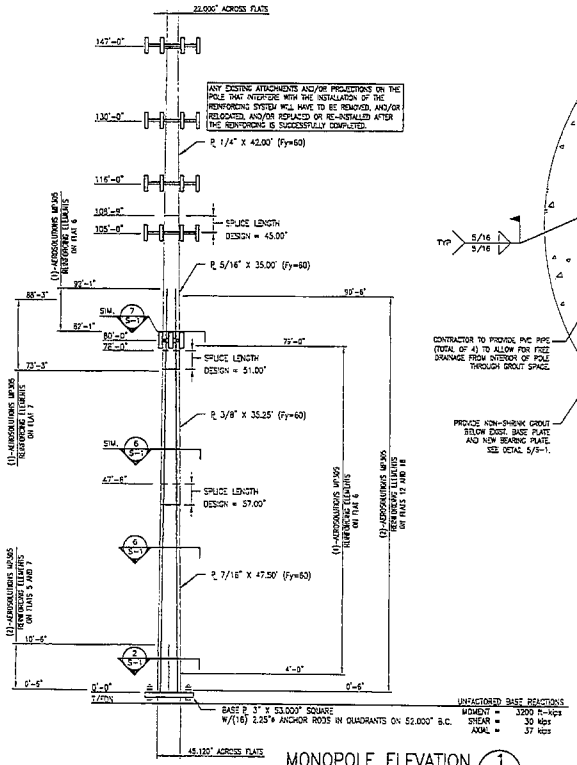
DISTRICT OF COLUMBIA	2	75

State of FLORIDA

COUNTY	NOTE*	BASIC WIND SPEED (MPH)
ALACHUA	2	95
BAKER	2	90
BAY	2	100
BRADFORD	2	95
BREVARD	2	105
BROWARD	2	115
CALHOUN	2	100
CHARLOTTE	2	105
CITRUS	2	100
CLAY	2	95
COLLIER	2	110
COLUMBIA	2	90
DADE	2	115
DE SOTO	2	105
DIXIE	2	100
DUVAL	2	95
ESCAMBIA	2	100
FLAGLER	2	100
FRANKLIN	2	105
GADSDEN	2	95
GILCHRIST	2	95
GLADES	2	100
GULF	2	105
HAMILTON	2	90
HARDEE	2	100
HENDRY	2	105
HERNANDO	2	105
HIGHLANDS	2	100
HILLSBOROUGH	2	105
HOLMES	2	95
INDIAN RIVER	2	105
JACKSON	2	95
JEFFERSON	2	95
LAFAYETTE	2	95
LAKE	2	100
LEE	2	105
LEON	2	95
LEVY	2	100
LIBERTY	2	100
MADISON	2	95
MANATEE	2	105
MARION	2	100
MARTIN	2	105
MONROE	2	120
NASSAU	2	95
OKALOOSA	2	100
OKEECHOBEE	2	100

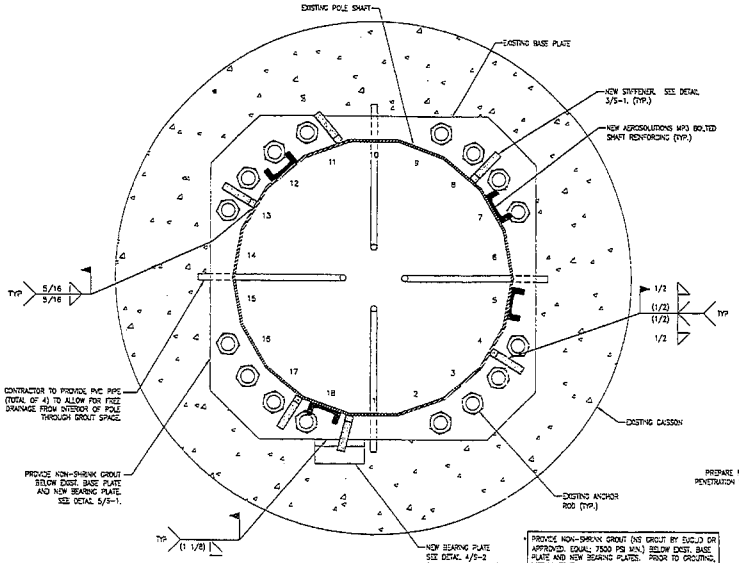
*For notes, see end of Section 16

THIS POLE REINFORCEMENT DRAWING IS FOR THE POLE DESIGN AND ANTENNA LOADING DOCUMENTED IN THE PJF CO-LOCATION ANALYSIS FOR THIS SITE (PJF#41708-0180_RP), DATED 3-16-2009.

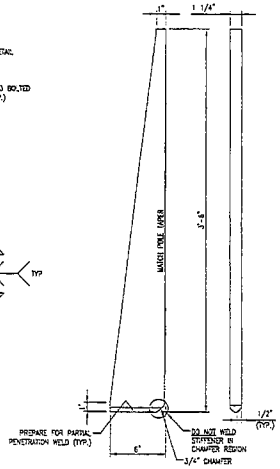


UNFACTORED BASE REACTIONS
MOMENT = 3200 ft-kips
SHEAR = 30 kips
AXIAL = 37 kips

MONOPOLE ELEVATION (1/S-1)
SCALE: NTS



BASE PLATE PLAN (2/S-1)



NEW STIFFENER (3/S-1)
(Fy = 65) (TYP. AT 6 LOCATIONS)

THE FOLLOWING NOTES WERE PROVIDED ON THE CONSTRUCTION DRAWINGS FOR THIS SITE:

GENERAL NOTES:

1. POLE REINFORCING DESIGN MEETS THE RECOMMENDATIONS OF THE TIA/EIA-222-F 1996 FOR WIND SPEEDS OF 85 MPH AND 74 MPH WITH 1/2" RADIAL ICE.

2. ALL NEW SHAFT FLAT PLATE REINFORCING STEEL SHALL BE ASTM A572, GR 65. ALL NEW SHAFT CHANNEL REINFORCING STEEL SHALL BE ASTM A572, GR 50. ALL NEW BRACKET STEEL SHALL BE ASTM A572, GR. 50 (BRACKET PLATE) AND ASTM A53, GR. E (35 KSI; BRACKET PIPE). ALTERNATIVELY, NEW BRACKET PIPE MAY BE ASTM A106, GR B (35 KSI).

3. ALL STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123. ALTERNATIVELY, ALL NEW SHAFT STEEL REINFORCING MAY BE COLD GALVANIZED AS FOLLOWS: APPLY A MINIMUM OF TWO COATS OF ZRC-BRAND ZINC -RICH COLD GALVANIZING COMPOUND. FILM THICKNESS PER COAT SHALL BE: WET 3.0 MILS; DRY 1.5 MILS. APPLY PER ZRC (MANUFACTURER) RECOMMENDED PROCEDURES. CONTACT ZRC AT 1-800-831-3275 FOR PRODUCT INFORMATION.

4. AS REQUIRED ALL WELDING SHALL BE IN ACCORDANCE WITH AWS D1.1. ELECTRODES SHALL BE E70XX LOW HYDROGEN. THE CONTRACTOR SHALL FOLLOW ALL CO/USA WELDING AND SAFETY GUIDELINES AND AEROSOLUTIONS FIELD WELDING PROCEDURE.

5. AS REQUIRED PREPARE ALL FIELD WELDS ACCORDING TO AWS D1.1. REMOVE EXISTING GALVANIZING IN AREAS OF FIELD WELDS PRIOR TO WELDING.

6. PRIOR TO INSTALLATION OF SHAFT STEEL REINFORCING, JACK SLIP JOINTS AT 41' AND 80' ELEVATIONS WITH (2) 6 TON COME-A-LONGS. NOTE ANY MOVEMENT AND REPORT TO AEROSOLUTIONS FIELD PERSONNEL.

7. PRIOR TO CONSTRUCTION, CONTRACTOR SHALL NUMBER ALL FLATS WITH PERMANENT MARKER. NUMBERING MUST BE INSPECTED AND APPROVED BY AEROSOLUTIONS FIELD PERSONNEL.

8. CONTRACTOR SHALL MARK ALL PROPOSED LOCATIONS FOR NEW ANCHOR BOLTS AND NEW BRACKETS AND HAVE AEROSOLUTIONS FIELD PERSONNEL APPROVE LOCATIONS BEFORE PROCEEDING WITH FIELD WELDING OR DRILLING OF HOLES FOR NEW ANCHOR BOLTS.

9. NEW ANCHOR ROD REINFORCING (150 KSI RODS) SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS. ONCE ALL RESIN AND GROUT HAVE CURED, ALL NEW ANCHOR ROD REINFORCING SHALL BE PROOF LOADED TO 210 KIPS. ONCE THE PROOF LOAD HAS BEEN RELEASED, TIGHTEN HEAVY HEX NUT TO SNUG TIGHT PLUS 1/4 TURN OF NUT (REFER TO THE NEW ANCHOR & BRACKET DETAIL).

10. ONCE ALL CONSTRUCTION HAS BEEN COMPLETED, ANY AND ALL DAMAGED AREAS OF GALVANIZING SHALL BE TOUCHED UP WITH A MINIMUM OF TWO COATS OF ZRC-BRAND ZINC -RICH COLD GALVANIZING COMPOUND. FILM THICKNESS PER COAT SHALL BE: WET 3.0 MILS; DRY 1.5 MILS. APPLY PER ZRC (MANUFACTURER) RECOMMENDED PROCEDURES. CONTACT ZRC AT 1-800-831-3275 FOR PRODUCT INFORMATION.

11. CONTRACTOR SHALL COMPLY WITH, COOPERATE WITH, AND FOLLOW THE INSTRUCTIONS OF THE AEROSOLUTIONS FIELD PERSONNEL.

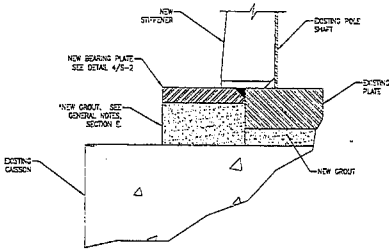
NOTE: RECORD DRAWING WAS PREPARED BASED ON THE INFORMATION AND 'AS-BUILT' DOCUMENTATION RECEIVED FROM AEROSOLUTIONS' QUALITY CONTROL INSPECTOR. AEROSOLUTIONS HAS CERTIFIED THAT ALL INSTRUCTIONS AND SPECIFICATIONS WERE COMPLETED AS LISTED ABOVE.

LOAD CASES		
CASE 1	85 MPH WITH NO ICE	DESIGN WIND
CASE 2	74 MPH WITH 1/2" RADIAL ICE	REDUCED WIND WITH ICE
CASE 3	50 MPH WITH NO ICE	OPERATIONAL WIND

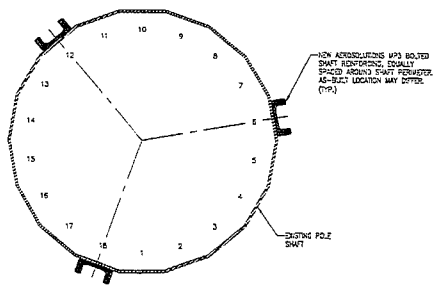
POLE SPECIFICATIONS	
Pole Shape Type:	18-SIDED POLYGON
Taper:	0.170034 IN/FT
Shaft Steel:	ASTM A607 GRADE 80
Base PL Steel:	ASTM A572 GRADE 50 (50 KSI)
Anchor Rods:	2 1/4"ø (18) ASTM A615 GRADE 75

SHAFT SECTION DATA					
Shaft Section	Section Length (feet)	Plate Thickness (in.)	Lap Splice (in.)	Diameter Across Flats (inches) @ Top	Diameter Across Flats (inches) @ Bottom
1	42.00	0.2500		22.000	29.141
2	35.00	0.3125	45.00	28.004	33.955
3	35.25	0.3750	51.00	32.607	38.801
4	47.50	0.4375	57.00	37.043	45.120

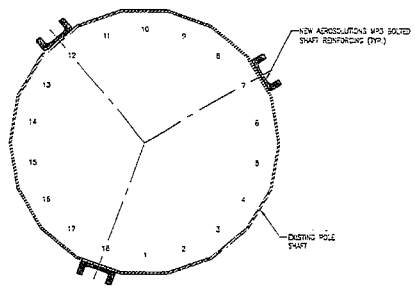
NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES



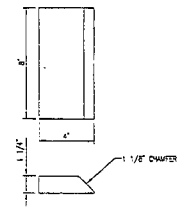
NEW BEARING PLATE DETAIL (5/S-1)
(TYP. AT 2 LOCATIONS)



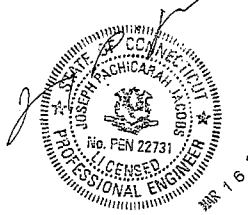
SHAFT PLAN (6/S-1)



SHAFT PLAN (7/S-1)



NEW BEARING PLATE (4/S-1)
(Fy = 65) (TYP. AT 2 LOCATIONS)



RECORD DRAWING

MONOPOLE REINFORCEMENT AND RETROFIT PROJECT
BU 876316; SECONDINO PROPERTY; BRANDFORD, CONNECTICUT

AeroSolutions LLC
(Only Engineers & Mechanics)
1966 13TH STREET, SUITE 230, BOULDER, COLORADO 80302
Tel 720.564.9252 Fax 720.304.5455 www.AeroSolutionsLLC.com

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street - Suite 1900 - Columbus, Ohio 43215
(614) 221-6679 www.pjford.com

Job No.	41708-0180
Date	3-16-2009
Scale	N.T.S.
Designed By	V.Y.
Drawn By	B.M.S.
Checked By	V.F.
SHEET NO	S-1

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

Phone: (860) 827-2935 Fax: (860) 827-2950

E-Mail: siting.council@ct.gov

Internet: ct.gov/csc

Daniel F. Caruso
Chairman

July 11, 2008

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103-3597

RE: **EM-VER-014-080602** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 21 Acorn Road, Branford, Connecticut.

Dear Attorney Baldwin:

The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies, with the following conditions:

- The tower is reinforced as recommended in the structural analysis report dated May 8, 2008 and sealed by Joseph Jacobs, P.E. prior to the antenna installation to achieve a post-construction tower rating of not more than 100 percent; and
- A signed letter from a Professional Engineer is submitted to the Council to certify that the reinforcements have been properly completed.

The proposed modifications are to be implemented as specified here and in your notice dated June 2, 2008, including the placement of all necessary equipment and shelters within the tower compound. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Any deviation from this format may result in the Council implementing enforcement proceedings pursuant to General Statutes § 16-50u including, without limitation, imposition of expenses resulting from such failure and of civil penalties in an amount not less than one thousand dollars per day for each day of construction or operation in material violation.

Thank you for your attention and cooperation.

Very truly yours,

S. Derek Phelps
Executive Director

SDP/MP/cm

c: The Honorable Anthony "Unk" DaRos, First Selectman, Town of Branford
Justine K. Gillen, ZEO, Town of Branford
Crown Castle

G:\EM\BAM-VERIZON\BRANFORD\dc071108.DOC

STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
Internet: ct.gov/csc

Daniel F. Caruso
Chairman

June 3, 2008

The Honorable Anthony "Unk" DaRos
First Selectman
Town of Branford
Town Hall
1019 Main Street
P. O. Box 150
Branford, CT 06405-0150

RE: **EM-VER-014-080602** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 21 Acorn Road, Branford, Connecticut.

Dear Mr. DaRos:

The Connecticut Siting Council (Council) received this request to modify an existing telecommunications facility, pursuant to Regulations of Connecticut State Agencies Section 16-50j-72.

If you have any questions or comments regarding this proposal, please call me or inform the Council by June 16, 2008.

Thank you for your cooperation and consideration.

Very truly yours,

S. Derek Phelps
Executive Director

SDP/jb

Enclosure: Notice of Intent

c: Justine K. Gillen, Zoning Enforcement Officer, Town of Branford
Diana Ross

ROBINSON & COLE

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

EM-VER-014-080602

ORIGINAL

June 2, 2008

RECEIVED
JUN 2 - 2008
CONNECTICUT
SITING COUNCIL

Via Hand Delivery

S. Derek Phelps
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Notice of Exempt Modification – Antenna Swap**
21 Acorn, Branford, Connecticut

Dear Mr. Phelps:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains a wireless telecommunications facility at the above-referenced address. The Council approved Cellco's shared use of this facility on June 8, 2005. Cellco now intends to modify its installation by replacing two (2) cellular antennas with two (2) newer model LPA-80063/6CF cellular antennas at the 116-foot level on the 150-foot tower and adding two (2) tower mounted amplifiers (TMAs). The tower is owned by Crown Castle International. Attached behind Tab 1 are the specifications for the proposed replacement antennas and TMAs, as well as a typical TMA mounting detail.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Anthony DaRos, First Selectman of the Town of Branford. Pursuant to a Council directive, a copy of this letter is also being sent to Altrio Investment Group LLC, the owner of the property on which the facility is located.

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).

1. The proposed modifications will not result in the increase in the overall height of the existing structure. Cellco's replacement antennas and TMAs will be located at the 116-foot level of the 150-foot tower.

2. The proposed modifications will not involve any ground-mounted equipment and, therefore, will not require the extension of the site boundaries.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more.

4. The operation of the replacement antennas will not increase radio frequency (RF) power density levels at the facility to a level at or above the Federal Communications Commission (FCC) adopted safety standard. A cumulative power density table for the facility is included behind Tab 2.

Also attached is a Structural Analysis Report confirming that the tower can support the proposed modifications. (See Tab 3).

For the foregoing reasons, Cellco respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Anthony DaRos, Branford First Selectman
Altrio Investment Group LLC
Sandy M. Carter

Vertically Polarized, Log Periodic 63° / 14.5 dBd

LPA-80063/6CF ___

When ordering replace "___" with connector type.

Mechanical specifications

Length	1800 mm	70.9 in
Width	380 mm	15.0 in
Depth	332 mm	13.1 in
Depth with z-bracket	372 mm	14.6 in
[4] Weight	12.3 kg	27.0 lbs
Wind Area		
Fore/Aft	0.68 m^2	7.4 ft^2
Side	0.60 m^2	6.5 ft^2

Rated Wind Velocity (Safety factor 2.0)
>235 km/hr >146 mph

Wind Load @ 100 mph (161 km/hr)

Fore/Aft	993 N	223.3 lbs
Side	872 N	196.1 lbs

Antenna consisting of aluminum alloy with brass feedlines covered by a UV safe fiberglass radome.

Mounting and Downtilting

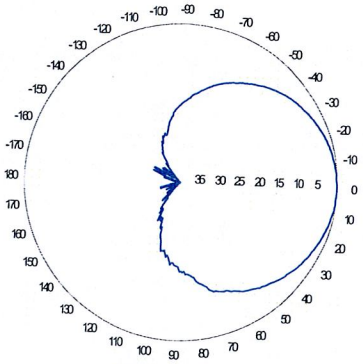
Mounting brackets attach to a pipe diameter of Ø50-102 mm (2.0-4.0 in). If the lock-down brace is used, the maximum diameter is Ø88.9 mm (3.5 in)

Mounting Bracket & Downtilt Bracket Kit #21699999

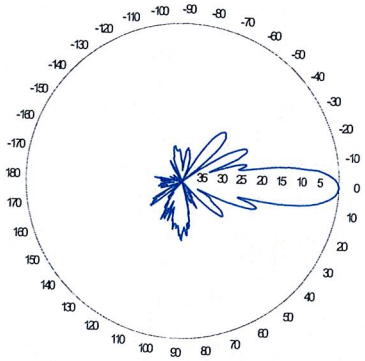
Electrical specifications

Frequency Range	806-960 MHz
Impedance	50Ω
[3] Connector(s)	NE or E-DIN 1 port / center
[1] VSWR	≤ 1.4:1
Polarization	Vertical
[1] Gain	14.5 dBd
[2] Power Rating	500 W
[1] Half Power Angle	
H-Plane	63°
E-Plane	10°
[1] Electrical Downtilt	0°
[1] Null Fill	10%
Lightning Protection	Direct Ground

Radiation pattern[1]



Horizontal

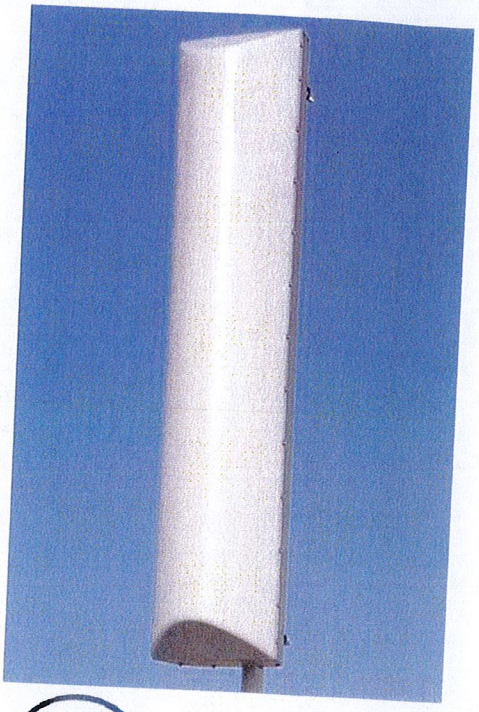


Vertical

Featuring upper side lobe suppression.

Radiation patterns for all antennas are measured with the antenna mounted on a fiberglass pole.

Mounting on a metal pole will typically improve the Front-to-Back ratio.



Amphenol Antel's Exclusive 3T (True Transmission Line Technology) Antenna Design:

- True log-periodic design allows for superior front-to-side characteristics to minimize sector overlap.
- Unique feedline design eliminates the need for conventional solder joints in the signal path.
- A non-collinear system with access to every radiating element for broad band-width and superior performance.
- Air as insulation for virtually no internal signal loss.

This Amphenol Antel antenna is under a five-year limited warranty for repair or replacement.

Antenna available with center-fed connector only.

1) Typical values.
2) Power rating limited by connector only.
3) NE indicates an elongated N connector. E-DIN indicates an elongated DIN connector.
4) The antenna weight listed above does not include the bracket weight.

Improvements to mechanical and/or electrical performance of the antenna may be made without notice.

CF Denotes a Center-Fed Connector.

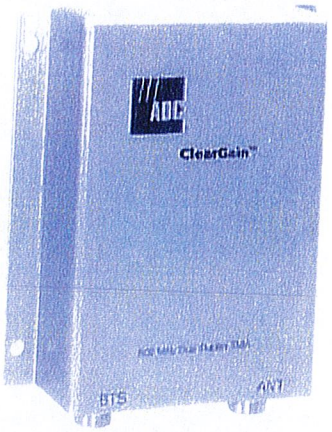
806-960 MHz

Amphenol Antel, Inc. 1300 Capital Drive Rockford, Illinois 61109 USA Tel. (815) 399-0001
Toll-Free (888) 417-9562 Fax. (815) 399-0156 antel@antelinc.com www.antelinc.com

Amphenol Antel, Inc.
The Antenna Technology Company

Revision Date: 7/5/07

ClearGain® Tower-Mounted Amplifiers
Americas



As mobile usage continues to increase, service providers are faced with the challenge of optimizing and expanding their wireless networks to provide new and existing services. ADC's ClearGain® Tower-Mounted Amplifiers (TMAs) minimize the cost of network expansion and improve quality of service, allowing service providers to increase profitability from new and existing services.

The ClearGain TMAs improve signal quality by boosting the uplink signal of a mobile system to increase receiver performance and improve overall coverage.

Features:

- Provides amplification of the Band
- Highly advanced LNA amplifies RX signal for improved receiver performance and increase in coverage
- Dual duplex feature reduces the number of feeder cable runs by providing simultaneous operation of TX and RX with low TX loss
- Full Band feature provides amplification of the entire band
- Advanced filtering maintains the lowest possible noise figure for improved quality of service
- Slim, stackable design conserves tower space and reduces tower-related costs
- Seamless aluminum sleeve construction protects components from the elements
- Modular system is fully compatible with all base stations
- Power and alarming for up to six masthead units is provided from a single unit at the base station

www.adc.com • +1-952-938-8080 • 1-800-366-3891

ClearGain® Tower-Mounted Amplifiers
Americas

Introduction

Unacceptable network quality is one of the main reasons for mobile subscriber churn. With industry churn at their current rates, a service provider's entire customer base could be lost in as few as three years. The cost of acquiring new subscribers to replace the existing customer base can be enormous. Improvements in quality of service can directly impact a service provider's profitability through the cost savings associated with increased subscriber retention and the additional revenue gained from increased billable minutes of use resulting from improved signal quality.

While subscribers are willing to pay a premium for data services, improved quality of service is necessary to provide new data services. Due to the tradeoff between bit rate and bandwidth inherent to data services, improved signal quality is required to achieve the same level of performance at even higher data rates. ADC's ClearGain Tower-Mounted Amplifiers help provide this improvement in signal quality.

TMAs improve signal quality by boosting the uplink (RX) signal of a mobile system immediately after the antenna. This compensates for the loss in signal strength that occurs when the signal is passed through the coaxial feeder cable to the base transceiver station (BTS) at the base of the tower. ClearGain TMAs perform this amplification with the lowest possible noise contribution, resulting in a substantial increase in receiver performance and an improvement in overall coverage. These improvements in quality of service allow mobile subscribers to place more calls, make longer calls, and successfully complete calls in an expanded geographic area, resulting in increased revenue.

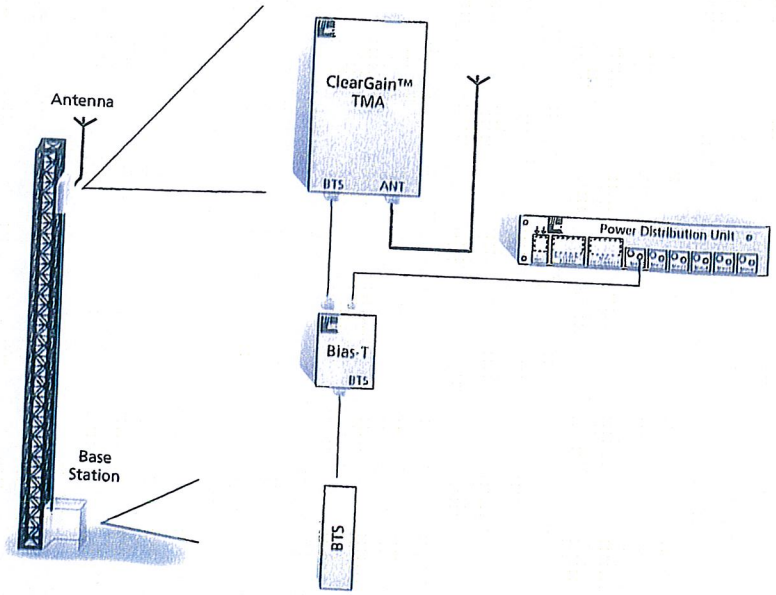
System Overview

The ClearGain TMA system is modular, consisting of a Masthead Unit (MHU), a Power Distribution Unit (PDU) and a Bias-T Unit. This system provides full compatibility with all base stations. The ClearGain MHU offers dual duplex operation and incorporates a highly advanced fixed-gain, low-noise amplifier (LNA) and high-performance filters for added reliability. The MHU amplifies each band to maximize signal quality and optimize coverage.

The ClearGain MHU features a slim, lightweight design. This allows two ClearGain TMAs to be mounted with one set of brackets thereby, conserving valuable and costly tower space and reducing clutter on the tower. The TMA is protected with a strong, aluminum sleeve construction designed to ensure superior weather protection and resistance to corrosion, resulting in increased reliability.

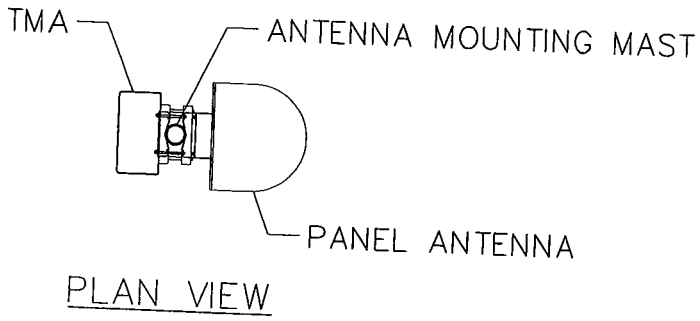
In the ClearGain TMA system, DC power is supplied to the MHU from a ClearGain PDU. The PDU also provides alarming and monitoring of the feeder cable and up to six MHUs from a single unit. The flexible design of the ClearGain PDU allows it to be rack- or wall-mounted on the side of a BTS cabinet.

An external Bias-T Unit is used in conjunction with the ClearGain PDU. The Bias-T inserts DC power onto the coaxial cable and extracts alarm and monitoring signals from the coaxial cable.

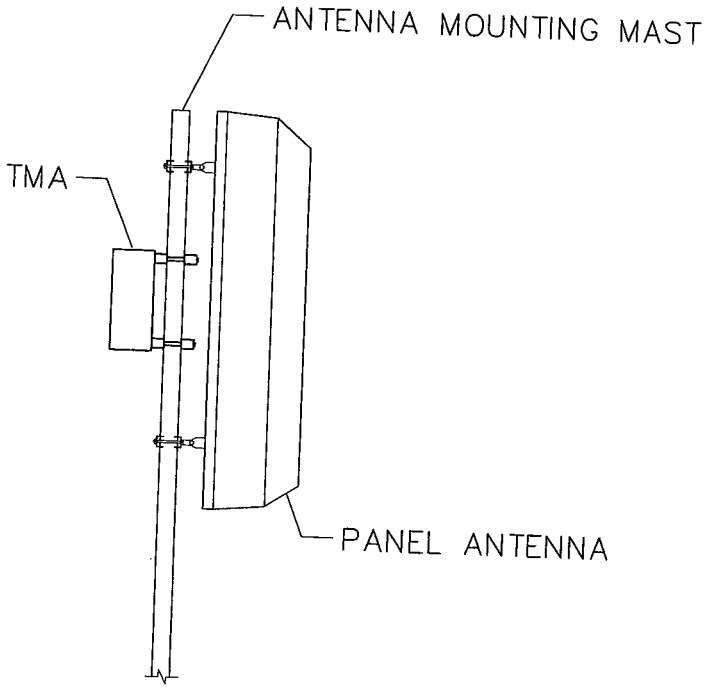


Dual Band 800/1900 MHz Full Band Typical Specifications

ELECTRICAL	
Nominal Impedance of RF Inputs and Outputs:	50 Ohm
Frequency Range	
TX: 800:	869-894 MHz
1900:	1930-1990 MHz
RX: 800:	824-849 MHz
1900:	1850-1910 MHz
Filter Bandwidth:	25/60 MHz
Passband (RX)	
Gain:	
Noise Figure:	12 dB
800:	1.5 dB
1900:	1.6 dB
Dynamic Range	
Input at 1 dB Gain Compression:	+0 dBm
IIP3:	+13 dBm
Max. Input Power:	+10 dBm
851 MHz Rejection:	<30 dB
1915 MHz Rejection:	<15 dB
1916 MHz Rejection:	<30 dB
Bypass Insertion Loss:	2.0 dB
Isolation in TX Path:	80 dB
Insertion Loss of TX Path (TX to Antenna):	4 dB
Passband Return Loss:	
TX Band:	>18 dB
RX Band:	>18 dB
Intemodulation:	-120 dBm
Max. Input Power (RMS Power):	
800:	500 W
1900:	250 W
Tx Filter Rejection in RX Path:	40 dB
POWER	
Operational Voltage:	7 to 20 Vdc
Operational Current:	280 ± 10 mA
Alarm Current Level:	350-520 mA
PHYSICAL	
Dimensions (HxWxD):	357 mm x 287 mm x 149 mm
Weight:	10.5 kg (22.5 lbs.)
Color:	Silver
Housing:	Aluminum
CONNECTORS	
Antenna Connector:	7/16 DIN female
BTS Connector:	7/16 DIN female
ENVIRONMENTAL	
Operating Temperature:	-40° to +60 °C
Lightning Protection:	IEC 61000-4-5
Vibration:	
Storage:	ETS3019-1-1
Transport:	ETS3019-1-2
Operation:	ETS3019-1-3
REGULATORY	
EMC:	ETS300 342-2
APPROVALS	
FCC:	Part 15, Class A
UL:	1950
QUALITY	
MTBF:	900,000 hours



PLAN VIEW



SIDE ELEVATION

TYPICAL TOWER MOUNTED AMPLIFIER (TMA) - MOUNTING DETAIL

NOT TO SCALE

	General	Power	Density					
Site Name: Branford 3								
Tower Height: Verizon @ 116Ft.								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
* Cingular/UMTS	1	500	105	0.0163	1935	1	1.63%	
*Cingular/GSM	20	250	105	0.1631	880	0.5867	27.79%	
*Cingular/GSM	3	427	105	0.0418	1900	1.0000	4.18%	
*Sprint	11	122	150	0.0214	1957.5	1.0000	2.14%	
*Nextel	9	100	130	0.0191	851	0.5673	3.38%	
Verizon**	**9**	**766**	**116**	**0.1842**	**880**	**0.5866**	**31.40%**	
Verizon	**3**	**198**	**116**	**0.0159**	**1900**	**1.0000**	**1.59%**	72.11%
* Source: Siting Council								
** Including Tower Mounted Amplifiers (TMAs)								

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215-3708

May 8, 2008

Modified Structure is Adequate
Modified Monopole is Adequate
Existing Foundation is Adequate

William Hart
Crown Castle International
9105 Monroe Road
Suite 150
Charlotte, NC 28270
(704) 321-3856

Subject: Structural Analysis Report of Existing 147-Ft Monopole w/ Proposed Reinforcement

Carrier Designation	**Verizon Wireless Co-Locate**	
	Carrier Site Number:	**TBD**
	Carrier Site Name:	**Branford 3, CT**
Crown Castle Designation	**Crown Castle BU Number:**	**876316**
	Crown Castle Site Name:	**Secondino Property**
	Crown Castle JDE Job Number:	**102052**
	Crown Castle Application Number:	**59451 Rev. #5**
	Crown Castle PO Number:	**285770**
	Crown Castle WO Number:	**208048**
Engineering Firm Designation	**Paul J. Ford and Company**	**37508-0592_BP**
Site Data	**21 Acorn Road, Branford, New Haven County, CT** **Latitude 41° 17' 35.06", Longitude -72° 45' 46.4"**	

Dear William Hart,

Paul J. Ford and Company is pleased to submit this "Structural Analysis Report" to determine the structural adequacy of the above monopole. This analysis has been performed in accordance with the Crown Castle Structural "Statement of Work", the terms of the Purchase Order, and the TIA/EIA-222-F Standard for the following Basic Wind Speeds: 85 mph without ice, 74 mph with 0.5" radial ice, and 50 mph (Operational) without ice.

The monopole was analyzed with the addition of the proposed antenna loading shown in the table below combined with the existing and reserved loading on the structure:

Elevation - ft	Count	Antenna Description
116	2	Antel LPA-80063/6CF w/ Mount Pipe
	2	ADC DUAL BAND 800/1900 FULL BAND

Based on our analysis, we have determined that (a.) the existing monopole structure is overstressed, and (b.) the foundation has sufficient capacity to support the existing, reserved, and proposed loading. When the specified modifications to the monopole structure are completed, the monopole and foundation will have sufficient capacity to support the existing, reserved, and proposed loading.

Respectfully submitted,

D. Scott Kramer P.E.
Project Engineer
dkramer@pjfweb.com

STATE OF CONNECTICUT
JOSEPH PATRICK JACOBS
No. PEN 22731
LICENSED PROFESSIONAL ENGINEER
MAY 07 2008

TABLE OF CONTENTS

INTRODUCTION

At the request of Crown Castle International, Paul J. Ford and Company has analyzed the monopole with proposed modifications at the Secondino Property site located in Branford, New Haven County, CT. This structural analysis has been performed in accordance with the TIA/EIA-222-F-1996 Standard, "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures" to determine if the monopole structure has adequate capacity to support the existing, reserved, and proposed antenna loading.

ANALYSIS CRITERIA

The existing monopole with proposed modifications has been analyzed for the antenna and coax loading listed in Tables 1A, 2A, and 2B below. The monopole has been analyzed in accordance with the TIA/EIA-222-F-1996 Standard for the following fastest-mile Basic Wind Speeds: 85 mph without ice, 74 with 0.5" radial ice, and 50 mph without ice as recommended for New Haven County, CT.

Table 1A - Proposed Antenna Information

Elevation - ft	Count	Antenna Description	Status
116	2	Antel LPA-80063/6CF w/ Mount Pipe	Proposed
	2	ADC DUAL BAND 800/1900 FULL BAND	Proposed

Table 2A - Existing and Reserved Antenna Information

Elevation - ft	Count	Antenna Description	Status
147	1	12' Low Profile Platform	Existing
145*	9	FV65-14-00NA2 w/Mount Pipe	MLA
132	12	FR90-12-00DAL2 w/Mount Pipe	Existing
130	1	12' Low Profile Platform	Existing
116	6	Antel LPA-185090/8CFx2 w/ mount pipe	Existing
	4	DB844H80-XY w/Mount Pipe	Existing
	1	12' Low Profile Platform	Existing
108	9	Powerwave Technologies 7770 w/ Mount Pipe	Existing
	12	Powerwave Technologies LGP2140X	Existing
105	1	12' Low Profile Platform	Existing
81	3	Kathrein OG-860/1920/GPS-A	Existing
80	3	3' Side Arm Mount	Existing

* The MLA loading controls and was used in this analysis. The existing loading consists of: (6) EMS FV65-14-00NA2 panel antennas.

Table 2B - Existing and Reserved Cable Information

Elevation - ft	Count	Cable Description	Location	Status
147 – 0*	9	LDF7-50A (1-5/8 FOAM)	Internal	MLA
130 - 0	12	LDF6-50A (1-1/4 FOAM)	Internal	Existing
116 - 0	12	LDF7-50A (1-5/8 FOAM)	Internal	Existing
105 - 0	12	LDF7-50A (1-5/8 FOAM)	Internal	Existing
80 - 0	3	LDF4RN-50A (1/2 FOAM)	Internal	Existing

* The MLA coax loading controls and was used in this analysis. The existing coax loading consists of: (6) 1-5/8" coax.

Information for the existing monopole and foundation is based on the available drawings, documents, and/or information listed in Table 3 below.

Table 3 - Reference Documents Provided

Document	Source	Reference	Remarks
Proposed Antenna Loading	Crown Castle	876316	CCI
Existing Antenna Loading	Crown Castle	876316	CCI
Original Tower Drawings	Crown Castle	1632399	Summit Manufacturing Inc., 29297-566, 09-29-1997
Foundation Drawings	Crown Castle	1632435	Summit Manufacturing Inc., 29297-566, 09-29-1997
Geotechnical Report	Crown Castle	1529736	Dr. Clarence Welti, P.E., Geotchnical Engineering, 12-16-1996
Structural Analysis	Crown Castle	2223600	Tower Engineering Profesionals, 080368, 03-04-2008
Modification Drawings	Crown Castle		PJF, 37508-0592_BP, 05-08-2008

ANALYSIS PROCEDURE

ANALYSIS METHODS

RISA Tower (Version 5.1.2.0), a commercially available software program, was used to create a three-dimensional model of the monopole and calculate member stresses for various dead, live, wind, and ice load cases. The analysis was performed in accordance with the TIA/EIA-222-F Standard. Selected output from the analysis is included in Appendix A.

ASSUMPTIONS

1. Monopole was fabricated and installed in accordance with the manufacturer's specifications.
2. Monopole has been properly maintained in accordance with manufacturer's specifications.
3. The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1A, 2A, and 2B and the referenced drawings.
4. Monopole is reinforced in accordance with the Paul J. Ford & Company modification drawings, PJF# 37508-0234_BP, dated 05-08-2008.

If any of the above assumptions are not valid or have been made in error, then the results of this analysis may be affected. In that case, please notify Paul J. Ford and Company immediately so that we can review any new and/or modified information and determine its affect on the analysis results regarding the structural adequacy of the monopole and foundation.

ANALYSIS RESULTS

Once the specified modifications to the existing monopole structure are completed, our structural analysis indicates that the reinforced monopole and existing foundation will have sufficient capacity to adequately support the existing, reserved, and proposed loading.

Table 4 - Component Stresses vs. Capacity (for Reinforced Condition)

Notes	Component	Elevation ft	% Capacity	Pass / Fail
Risa Tower Analysis Summary:				
	L1	147 - 105	64	Pass
	L2	105 - 90	87.2	Pass
	L3	90 - 73.75	67.8	Pass
	L4	73.75 - 42.75	83	Pass
	L5	42.75 - 0	93.1	Pass
Additional Components:				
	Base Plate	0 - 0	77.2	Pass
	Anchor Rods	0 - 0	94.5	Pass
	Foundation (Soil) - PJF Pole	0 - 0	92.2	Pass
	Foundation (Structural) - PJF Pole	0 - 0	51.7	Pass
		Structural Rating (maximum capacity of all components) =		**94.5**

Our analysis indicates that (a.) the existing monopole structure is overstressed, and (b.) the foundation has sufficient capacity to support the existing, reserved, and proposed loading. When the specified modifications to the monopole structure are completed, the monopole and foundation will have sufficient capacity to support the existing, reserved, and proposed loading, as summarized in Table 4 above.

APPENDIX A

Output From Computer Programs

Tower Input Data

There is a pole section.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Tower is located in New Haven County, Connecticut.
Basic wind speed of 85 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 74 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	√ Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Calculate Redundant Bracing Forces
Use Moment Magnification	√ Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
√ Use Code Stress Ratios	Use Clear Spans For KL/r	SR Leg Bolts Resist Compression
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	All Leg Panels Have Same Allowable
Escalate Ice	√ Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	√ Use Azimuth Dish Coefficients	√ Consider Feedline Torque
Use Special Wind Profile	√ Project Wind Area of Appurt.	Include Angle Block Shear Check
Include Bolts In Member Capacity	√ Autocalc Torque Arm Areas	**Poles**
Leg Bolts Are At Top Of Section	SR Members Have Cut Ends	√ Include Shear-Torsion Interaction
Secondary Horizontal Braces Leg	Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
Add IBC .6D+W Combination		

Tapered Pole Section Geometry

Section	*Elevation* ft	*Section Length* ft	*Splice Length* ft	*Number of Sides*	*Top Diameter* in	*Bottom Diameter* in	*Wall Thickness* in	*Bend Radius* in	*Pole Grade*
L1	147.00-105.00	42.00	3.75	18	22.0000	29.1410	0.2500	1.0000	A607-60 (60 ksi)
L2	105.00-90.00	18.75	0.00	18	28.0034	31.1900	0.3125	1.2500	A607-60 (60 ksi)
L3	90.00-73.75	16.25	4.25	18	31.1900	33.9550	0.4843	1.9372	A607-60 (60 ksi)
L4	73.75-42.75	35.25	4.75	18	32.2632	38.6010	0.5240	2.0959	A607-60 (60 ksi)
L5	42.75-0.00	47.50		18	36.6990	45.1200	0.5604	2.2416	A607-60 (60 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/ft
L1	22.3394	17.2586	1031.4832	7.7212	11.1760	92.2945	2064.3237	8.6310	3.4320	13.728
	29.5905	22.9250	2417.5313	10.2563	14.8036	163.3067	4838.2436	11.4647	4.6888	18.755
L2	29.0826	27.4659	2660.7626	9.8303	14.2257	187.0387	5325.0263	13.7356	4.3786	14.012
	31.6712	30.6266	3689.1030	10.9615	15.8445	232.8315	7383.0603	15.3162	4.9394	15.806
L3	31.6712	47.2006	5622.4122	10.9005	15.8445	354.8490	11252.222 6	23.6048	4.6371	9.575
	34.4788	51.4509	7282.1579	11.8821	17.2491	422.1751	14573.897 8	25.7304	5.1237	10.579
L4	33.5369	52.7863	6718.1890	11.2674	16.3897	409.9026	13445.217 9	26.3982	4.7561	9.077
	39.1965	63.3268	11599.816 5	13.5173	19.6093	591.5464	23214.896 3	31.6694	5.8716	11.206
L5	38.1202	64.2810	10606.268 1	12.8292	18.6431	568.9113	21226.492 1	32.1466	5.4727	9.766
	45.8160	79.2597	19882.560 7	15.8187	22.9210	867.4401	39791.283 3	39.6374	6.9548	12.41

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 147.00-105.00				1	1	1		
L2 105.00-90.00				1	1	1		
L3 90.00-73.75				1	1	1		
L4 73.75-42.75				1	1	1		
L5 42.75-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
LDF7-50A (1-5/8 FOAM) **	C	No	Inside Pole	147.00 - 0.00	9	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
LDF6-50A (1-1/4 FOAM) **	C	No	Inside Pole	130.00 - 0.00	12	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
LDF7-50A (1-5/8 FOAM) **	C	No	Inside Pole	116.00 - 0.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
LDF7-50A (1-5/8 FOAM) **	C	No	Inside Pole	105.00 - 0.00	12	No Ice	0.00	0.82
						1/2" Ice	0.00	0.82
LDF4RN-50A (1/2 FOAM) **	C	No	Inside Pole	80.00 - 0.00	3	No Ice	0.00	0.15
						1/2" Ice	0.00	0.15
Aero MP3-05	C	No	CaAa (Out Of Face)	90.00 - 0.00	1	No Ice	0.35	0.00
						1/2" Ice	0.40	0.00

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	147.00-105.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.62
L2	105.00-90.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.52
L3	90.00-73.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	5.652	0.57
L4	73.75-42.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	10.782	1.10
L5	42.75-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	14.868	1.51

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	147.00-105.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.62
L2	105.00-90.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.52
L3	90.00-73.75	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	6.501	0.57
L4	73.75-42.75	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	12.402	1.10
L5	42.75-0.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	17.103	1.51

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	147.00-105.00	0.0000	0.0000	0.0000	0.0000
L2	105.00-90.00	0.0000	0.0000	0.0000	0.0000
L3	90.00-73.75	-0.4005	0.2312	-0.4412	0.2547
L4	73.75-42.75	-0.4046	0.2336	-0.4473	0.2582
L5	42.75-0.00	-0.4104	0.2369	-0.4558	0.2631

Discrete Tower Loads

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* ft ft ft	*Azimuth Adjustment* °	*Placement* ft		*C_AA_A Front* ft^2	*C_AA_A Side* ft^2	*Weight* K
(3) FV65-14-00NA2 w/Mount Pipe	A	From Face	3.00 0.00 0.00	0.0000	145.00	No Ice 1/2" Ice	8.64 9.29	6.95 8.13	0.06 0.12
(3) FV65-14-00NA2 w/Mount Pipe	B	From Face	3.00 0.00 0.00	0.0000	145.00	No Ice 1/2" Ice	8.64 9.29	6.95 8.13	0.06 0.12
(3) FV65-14-00NA2 w/Mount Pipe	C	From Face	3.00 0.00 0.00	0.0000	145.00	No Ice 1/2" Ice	8.64 9.29	6.95 8.13	0.06 0.12
12' Low Profile Platform	C	None		0.0000	147.00	No Ice 1/2" Ice	30.00 35.00	30.00 35.00	1.10 1.70
**									
(4) FR90-12-00DAL2 w/Mount Pipe	A	From Face	3.00 0.00 0.00	0.0000	132.00	No Ice 1/2" Ice	8.64 9.29	6.95 8.13	0.06 0.12
(4) FR90-12-00DAL2 w/Mount Pipe	B	From Face	3.00 0.00 0.00	0.0000	132.00	No Ice 1/2" Ice	8.64 9.29	6.95 8.13	0.06 0.12
(4) FR90-12-00DAL2 w/Mount Pipe	C	From Face	3.00 0.00 0.00	0.0000	132.00	No Ice 1/2" Ice	8.64 9.29	6.95 8.13	0.06 0.12
12' Low Profile Platform	C	None		0.0000	130.00	No Ice 1/2" Ice	30.00 35.00	30.00 35.00	1.10 1.70
**									
(2) Antel LPA-185090/8CFx2 w/ mount pipe	A	From Face	3.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice	2.20 2.52	3.78 4.36	0.02 0.05
(2) Antel LPA-185090/8CFx2 w/ mount pipe	C	From Face	3.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice	2.20 2.52	3.78 4.36	0.02 0.05
(2) DB844H80-XY w/Mount Pipe	A	From Face	3.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice	3.58 4.20	5.63 6.73	0.04 0.08
(2) DB844H80-XY w/Mount Pipe	C	From Face	3.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice	3.58 4.20	5.63 6.73	0.04 0.08
(2) Antel LPA-80063/6CF w/ Mount Pipe	B	From Face	3.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice	10.43 11.04	10.53 11.67	0.05 0.14
(2) Antel LPA-185090/8CFx2 w/ mount pipe	B	From Face	3.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice	2.20 2.52	3.78 4.36	0.02 0.05
(2) ADC DUAL BAND 800/1900 FULL BAND	B	From Face	3.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice	0.65 0.76	0.81 0.94	0.03 0.04
12' Low Profile Platform	C	None		0.0000	116.00	No Ice 1/2" Ice	30.00 35.00	30.00 35.00	1.10 1.70
**									
(3) Powerwave Technologies 7770 w/ Mount Pipe	A	From Face	3.00 0.00 0.00	0.0000	108.00	No Ice 1/2" Ice	6.01 6.46	4.42 5.08	0.07 0.12
(3) Powerwave Technologies 7770 w/ Mount Pipe	B	From Face	3.00 0.00 0.00	0.0000	108.00	No Ice 1/2" Ice	6.01 6.46	4.42 5.08	0.07 0.12
(3) Powerwave	C	From Face	3.00	0.0000	108.00	No Ice	6.01	4.42	0.07

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral ft* / *Vert ft* / *ft*	*Azimuth Adjustment °*	*Placement ft*		*C_AA_A Front ft^2*	*C_AA_A Side ft^2*	*Weight K*
Technologies 7770 w/ Mount Pipe			0.00 0.00			1/2" Ice	6.46	5.08	0.12
(4) Powerwave Technologies LGP2140X	A	From Face	3.00 0.00 0.00	0.0000	108.00	No Ice 1/2" Ice	1.23 1.38	0.37 0.48	0.02 0.02
(4) Powerwave Technologies LGP2140X	B	From Face	3.00 0.00 0.00	0.0000	108.00	No Ice 1/2" Ice	1.23 1.38	0.37 0.48	0.02 0.02
(4) Powerwave Technologies LGP2140X	C	From Face	3.00 0.00 0.00	0.0000	108.00	No Ice 1/2" Ice	1.23 1.38	0.37 0.48	0.02 0.02
12' Low Profile Platform	C	None		0.0000	105.00	No Ice 1/2" Ice	30.00 35.00	30.00 35.00	1.10 1.70
**									
Kathrein OG-860/1920/GPS-A	A	From Face	3.00 0.00 0.00	0.0000	81.00	No Ice 1/2" Ice	0.14 0.23	0.14 0.23	0.00 0.00
Kathrein OG-860/1920/GPS-A	B	From Face	3.00 0.00 0.00	0.0000	81.00	No Ice 1/2" Ice	0.14 0.23	0.14 0.23	0.00 0.00
Kathrein OG-860/1920/GPS-A	C	From Face	3.00 0.00 0.00	0.0000	81.00	No Ice 1/2" Ice	0.14 0.23	0.14 0.23	0.00 0.00
3' Side Arm Mount	A	None		0.0000	80.00	No Ice 1/2" Ice	0.76 0.96	0.76 0.96	0.03 0.04
3' Side Arm Mount	B	None		0.0000	80.00	No Ice 1/2" Ice	0.76 0.96	0.76 0.96	0.03 0.04
3' Side Arm Mount	C	None		0.0000	80.00	No Ice 1/2" Ice	0.76 0.96	0.76 0.96	0.03 0.04

Tower Pressures - No Ice

$G_H = 1.690$

Section Elevation ft	*z ft*	*K_z*	*q_z psf*	*A_G ft^2*	*Face*	*A_F ft^2*	*A_R ft^2*	*A_{leg} ft^2*	*Leg %*	*C_AA_A In Face ft^2*	*C_AA_A Out Face ft^2*
L1 147.00-105.00	125.27	1.464	27	89.497	A	0.000	89.497	89.497	100.00	0.000	0.000
					B	0.000	89.497		100.00	0.000	0.000
					C	0.000	89.497		100.00	0.000	0.000
L2 105.00-90.00	97.39	1.362	25	37.394	A	0.000	37.394	37.394	100.00	0.000	0.000
					B	0.000	37.394		100.00	0.000	0.000
					C	0.000	37.394		100.00	0.000	0.000
L3 90.00-73.75	81.76	1.296	24	44.109	A	0.000	44.109	44.109	100.00	0.000	0.000
					B	0.000	44.109		100.00	0.000	0.000
					C	0.000	44.109		100.00	0.000	5.652
L4 73.75-42.75	58.14	1.176	22	92.520	A	0.000	92.520	92.520	100.00	0.000	0.000
					B	0.000	92.520		100.00	0.000	0.000
					C	0.000	92.520		100.00	0.000	10.782
L5 42.75-0.00	20.72	1	18	147.24	A	0.000	147.240	147.240	100.00	0.000	0.000

Section Elevation ft	z ft	K_z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
				0	B	0.000	147.240		100.00	0.000	0.000
					C	0.000	147.240		100.00	0.000	14.868

Tower Pressure - With Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_z	q_z psf	t_z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 147.00-105.00	125.27	1.464	20	0.5000	92.997	A	0.000	92.997	92.997	100.00	0.000	0.000
						B	0.000	92.997		100.00	0.000	0.000
						C	0.000	92.997		100.00	0.000	0.000
L2 105.00-90.00	97.39	1.362	19	0.5000	38.644	A	0.000	38.644	38.644	100.00	0.000	0.000
						B	0.000	38.644		100.00	0.000	0.000
						C	0.000	38.644		100.00	0.000	0.000
L3 90.00-73.75	81.76	1.296	18	0.5000	45.463	A	0.000	45.463	45.463	100.00	0.000	0.000
						B	0.000	45.463		100.00	0.000	0.000
						C	0.000	45.463		100.00	0.000	6.501
L4 73.75-42.75	58.14	1.176	16	0.5000	95.103	A	0.000	95.103	95.103	100.00	0.000	0.000
						B	0.000	95.103		100.00	0.000	0.000
						C	0.000	95.103		100.00	0.000	12.402
L5 42.75-0.00	20.72	1	14	0.5000	150.803	A	0.000	150.803	150.803	100.00	0.000	0.000
						B	0.000	150.803		100.00	0.000	0.000
						C	0.000	150.803		100.00	0.000	17.103

Tower Pressure - Service

$G_H = 1.690$

Section Elevation ft	z ft	K_z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 147.00-105.00	125.27	1.464	9	89.497	A	0.000	89.497	89.497	100.00	0.000	0.000
					B	0.000	89.497		100.00	0.000	0.000
					C	0.000	89.497		100.00	0.000	0.000
L2 105.00-90.00	97.39	1.362	9	37.394	A	0.000	37.394	37.394	100.00	0.000	0.000
					B	0.000	37.394		100.00	0.000	0.000
					C	0.000	37.394		100.00	0.000	0.000
L3 90.00-73.75	81.76	1.296	8	44.109	A	0.000	44.109	44.109	100.00	0.000	0.000
					B	0.000	44.109		100.00	0.000	0.000
					C	0.000	44.109		100.00	0.000	5.652
L4 73.75-42.75	58.14	1.176	7	92.520	A	0.000	92.520	92.520	100.00	0.000	0.000
					B	0.000	92.520		100.00	0.000	0.000
					C	0.000	92.520		100.00	0.000	10.782
L5 42.75-0.00	20.72	1	6	147.240	A	0.000	147.240	147.240	100.00	0.000	0.000
					B	0.000	147.240		100.00	0.000	0.000
					C	0.000	147.240		100.00	0.000	14.868

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 90 deg - No Ice
4	Dead+Wind 180 deg - No Ice
5	Dead+Ice+Temp
6	Dead+Wind 0 deg+Ice+Temp
7	Dead+Wind 90 deg+Ice+Temp
8	Dead+Wind 180 deg+Ice+Temp
9	Dead+Wind 0 deg - Service
10	Dead+Wind 90 deg - Service
11	Dead+Wind 180 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	147 - 105	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	5	-12.37	-0.71	0.41
			Max. Mx	3	-6.63	-395.01	0.65
			Max. My	2	-6.64	-0.73	394.27
			Max. Vy	3	17.57	-395.01	0.65
			Max. Vx	2	-17.49	-0.73	394.27
			Max. Torque	4			1.81
L2	105 - 90	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	5	-18.56	-0.71	0.41
			Max. Mx	3	-11.24	-804.10	2.01
			Max. My	2	-11.25	-2.11	801.83
			Max. Vy	3	22.86	-804.10	2.01
			Max. Vx	2	-22.78	-2.11	801.83
			Max. Torque	4			1.81
L3	90 - 73.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	5	-21.34	-0.71	0.41
			Max. Mx	3	-13.88	-1084.96	2.88
			Max. My	2	-13.89	-2.99	1081.69
			Max. Vy	3	24.04	-1084.96	2.88
			Max. Vx	2	-23.95	-2.99	1081.69
			Max. Torque	4			1.81
L4	73.75 - 42.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	5	-29.77	-0.71	0.41
			Max. Mx	3	-22.11	-1858.24	5.09
			Max. My	2	-22.11	-5.21	1852.46
			Max. Vy	3	26.57	-1858.24	5.09
			Max. Vx	2	-26.48	-5.21	1852.46
			Max. Torque	4			1.76
L5	42.75 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	5	-45.29	-0.71	0.41
			Max. Mx	3	-37.38	-3194.64	8.46
			Max. My	2	-37.38	-8.58	3184.98
			Max. Vy	3	29.59	-3194.64	8.46
			Max. Vx	2	-29.51	-8.58	3184.98
			Max. Torque	4			1.67

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	5	45.29	-0.00	0.00
	Max. H_x	4	37.41	0.07	-29.48
	Max. H_z	2	37.41	-0.07	29.48
	Max. M_x	2	3184.98	-0.07	29.48
	Max. M_z	3	3194.64	-29.56	0.07
	Max. Torsion	4	1.55	0.07	-29.48
	Min. Vert	3	37.41	-29.56	0.07
	Min. H_x	3	37.41	-29.56	0.07
	Min. H_z	4	37.41	0.07	-29.48
	Min. M_x	4	-3184.63	0.07	-29.48
	Min. M_z	4	-8.00	0.07	-29.48
	Min. Torsion	2	-1.55	-0.07	29.48

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	37.41	0.00	-0.00	-0.17	-0.29	0.00
Dead+Wind 0 deg - No Ice	37.41	0.07	-29.48	-3184.98	-8.58	1.55
Dead+Wind 90 deg - No Ice	37.41	29.56	-0.07	-8.46	-3194.64	-0.89
Dead+Wind 180 deg - No Ice	37.41	-0.07	29.48	3184.63	8.00	-1.55
Dead+Ice+Temp	45.29	0.00	-0.00	-0.41	-0.71	0.00
Dead+Wind 0 deg+Ice+Temp	45.29	0.05	-24.34	-2692.28	-6.79	1.16
Dead+Wind 90 deg+Ice+Temp	45.29	24.40	-0.05	-6.47	-2699.55	-0.67
Dead+Wind 180 deg+Ice+Temp	45.29	-0.05	24.34	2691.40	5.27	-1.16
Dead+Wind 0 deg - Service	37.41	0.02	-10.20	-1103.55	-3.17	0.54
Dead+Wind 90 deg - Service	37.41	10.23	-0.02	-3.05	-1106.99	-0.31
Dead+Wind 180 deg - Service	37.41	-0.02	10.20	1103.20	2.57	-0.54

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-37.41	0.00	-0.00	37.41	0.00	0.000%
2	0.07	-37.41	-29.48	-0.07	37.41	29.48	0.002%
3	29.56	-37.41	-0.07	-29.56	37.41	0.07	0.002%
4	-0.07	-37.41	29.48	0.07	37.41	-29.48	0.002%
5	0.00	-45.29	0.00	-0.00	45.29	0.00	0.000%
6	0.05	-45.29	-24.34	-0.05	45.29	24.34	0.000%
7	24.40	-45.29	-0.05	-24.40	45.29	0.05	0.000%
8	-0.05	-45.29	24.34	0.05	45.29	-24.34	0.000%
9	0.02	-37.41	-10.20	-0.02	37.41	10.20	0.005%
10	10.23	-37.41	-0.02	-10.23	37.41	0.02	0.005%
11	-0.02	-37.41	10.20	0.02	37.41	-10.20	0.005%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	15	0.00000001	0.00011374
3	Yes	15	0.00000001	0.00007512
4	Yes	15	0.00000001	0.00008789
5	Yes	6	0.00000001	0.00000001
6	Yes	17	0.00000001	0.00008485
7	Yes	17	0.00000001	0.00008360
8	Yes	17	0.00000001	0.00008400
9	Yes	13	0.00011664	0.00012065
10	Yes	13	0.00011663	0.00009888
11	Yes	13	0.00011664	0.00011502

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	147 - 105	35.317	10	2.0281	0.0039
L2	108.75 - 90	19.829	10	1.7242	0.0030
L3	90 - 73.75	13.601	10	1.4052	0.0018
L4	78 - 42.75	10.292	10	1.2253	0.0014
L5	47.5 - 0	3.867	10	0.7518	0.0006

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
147.00	12' Low Profile Platform	10	35.317	2.0281	0.0039	29117
145.00	(3) FV65-14-00NA2 w/Mount Pipe	10	34.467	2.0192	0.0039	29117
132.00	(4) FR90-12-00DAL2 w/Mount Pipe	10	28.988	1.9533	0.0038	9705
130.00	12' Low Profile Platform	10	28.159	1.9408	0.0038	8563
116.00	(2) Antel LPA-185090/8CFx2 w/ mount pipe	10	22.551	1.8190	0.0034	4695
108.00	(3) Powerwave Technologies 7770 w/ Mount Pipe	10	19.557	1.7129	0.0030	3781
105.00	12' Low Profile Platform	10	18.484	1.6648	0.0028	3597
81.00	Kathrein OG-860/1920/GPS-A	10	11.077	1.2705	0.0015	4236
80.00	3' Side Arm Mount	10	10.813	1.2557	0.0014	4411

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	147 - 105	101.701	3	5.8427	0.0112
L2	108.75 - 90	57.142	3	4.9687	0.0088
L3	90 - 73.75	39.208	3	4.0508	0.0052
L4	78 - 42.75	29.674	3	3.5329	0.0039

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L5	47.5 - 0	11.154	3	2.1685	0.0018

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
147.00	12' Low Profile Platform	3	101.701	5.8427	0.0112	10303
145.00	(3) FV65-14-00NA2 w/Mount Pipe	3	99.256	5.8169	0.0112	10303
132.00	(4) FR90-12-00DAL2 w/Mount Pipe	3	83.495	5.6263	0.0109	3432
130.00	12' Low Profile Platform	3	81.110	5.5901	0.0109	3028
116.00	(2) Antel LPA-185090/8CFx2 w/ mount pipe	3	64.974	5.2403	0.0098	1657
108.00	(3) Powerwave Technologies 7770 w/ Mount Pipe	3	56.358	4.9362	0.0086	1333
105.00	12' Low Profile Platform	3	53.271	4.7986	0.0081	1267
81.00	Kathrein OG-860/1920/GPS-A	3	31.937	3.6600	0.0042	1482
80.00	3' Side Arm Mount	3	31.175	3.6179	0.0041	1543

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	147 - 105 (1)	TP29.141x22x0.25	42.00	0.00	0.0	36.000	22.4191	-6.63	807.09	0.008
L2	105 - 90 (2)	TP31.19x28.0034x0.3125	18.75	0.00	0.0	36.000	30.6266	-11.24	1102.56	0.010
L3	90 - 73.75 (3)	TP33.955x31.19x0.4843	16.25	0.00	0.0	36.000	50.3393	-13.88	1812.22	0.008
L4	73.75 - 42.75 (4)	TP38.601x32.2632x0.524	35.25	0.00	0.0	36.000	61.9065	-22.11	2228.63	0.010
L5	42.75 - 0 (5)	TP45.12x36.699x0.5604	47.50	0.00	0.0	36.000	79.2597	-37.38	2853.35	0.013

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	147 - 105 (1)	TP29.141x22x0.25	395.01	30.356	36.000	0.843	0.00	0.000	36.000	0.000
L2	105 - 90 (2)	TP31.19x28.0034x0.3125	804.10	41.443	36.000	1.151	0.00	0.000	36.000	0.000
L3	90 - 73.75 (3)	TP33.955x31.19x0.4843	1084.96	32.226	36.000	0.895	0.00	0.000	36.000	0.000
L4	73.75 - 42.75 (4)	TP38.601x32.2632x0.524	1858.25	39.458	36.000	1.096	0.00	0.000	36.000	0.000
L5	42.75 - 0 (5)	TP45.12x36.699x0.5604	3194.66	44.194	36.000	1.228	0.00	0.000	36.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	147 - 105 (1)	TP29.141x22x0.25	17.57	0.784	24.000	0.065	1.04	0.039	24.000	0.002
L2	105 - 90 (2)	TP31.19x28.0034x0.3125	22.86	0.746	24.000	0.062	1.04	0.026	24.000	0.001
L3	90 - 73.75 (3)	TP33.955x31.19x0.4843	24.04	0.477	24.000	0.040	1.02	0.015	24.000	0.001
L4	73.75 - 42.75 (4)	TP38.601x32.2632x0.524	26.57	0.429	24.000	0.036	0.97	0.010	24.000	0.000
L5	42.75 - 0 (5)	TP45.12x36.699x0.5604	29.59	0.373	24.000	0.031	0.90	0.006	24.000	0.000

Pole Interaction Design Data

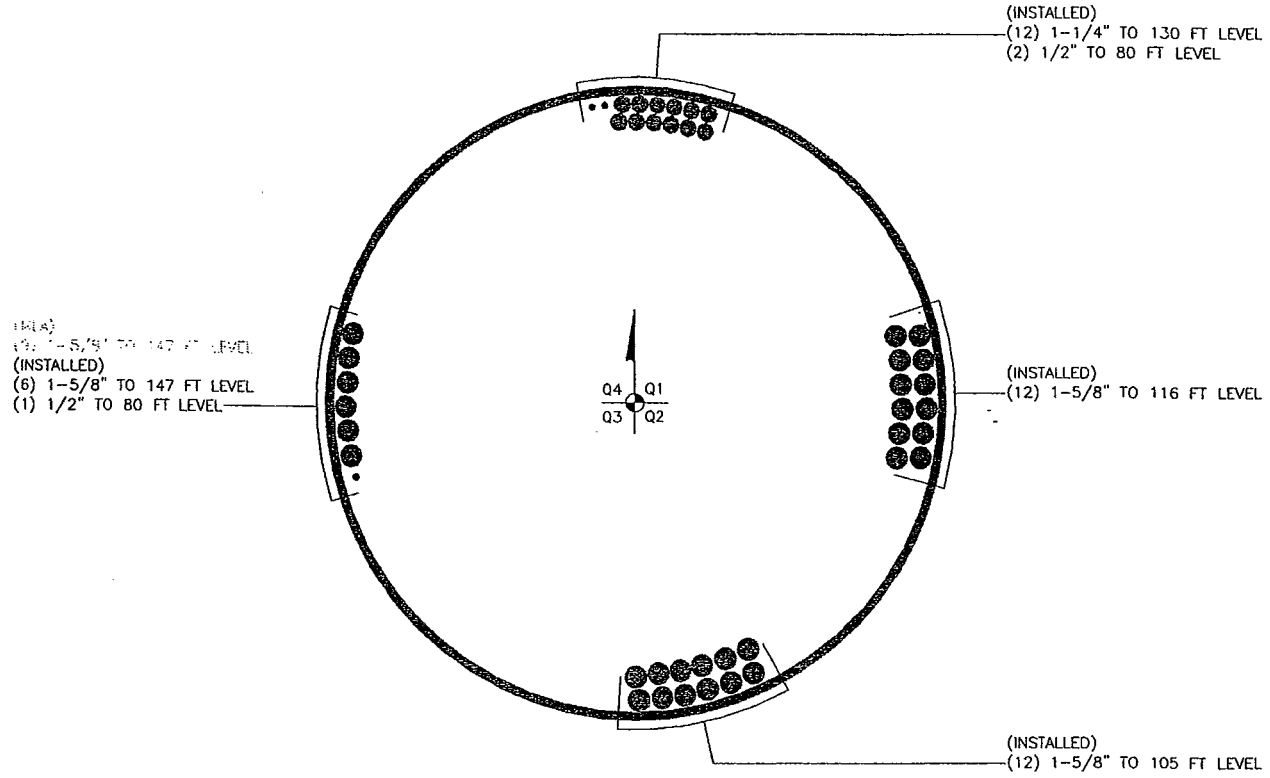
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	147 - 105 (1)	0.008	0.843	0.000	0.065	0.002	0.853 ✔	1.333	H1-3+VT ✔
L2	105 - 90 (2)	0.010	1.151	0.000	0.062	0.001	1.162 ✔	1.333	H1-3+VT ✔
L3	90 - 73.75 (3)	0.008	0.895	0.000	0.040	0.001	0.903 ✔	1.333	H1-3+VT ✔
L4	73.75 - 42.75 (4)	0.010	1.096	0.000	0.036	0.000	1.106 ✔	1.333	H1-3+VT ✔
L5	42.75 - 0 (5)	0.013	1.228	0.000	0.031	0.000	1.241 ✔	1.333	H1-3+VT ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	147 - 105	Pole	TP29.141x22x0.25	1	-6.63	1075.85	64.0	Pass
L2	105 - 90	Pole	TP31.19x28.0034x0.3125	2	-11.24	1469.71	87.2	Pass
L3	90 - 73.75	Pole	TP33.955x31.19x0.4843	3	-13.88	2415.69	67.8	Pass
L4	73.75 - 42.75	Pole	TP38.601x32.2632x0.524	4	-22.11	2970.76	83.0	Pass
L5	42.75 - 0	Pole	TP45.12x36.699x0.5604	5	-37.38	3803.52	93.1	Pass
							Summary	
						Pole (L5)	93.1	Pass
						RATING =	**93.1**	**Pass**

APPENDIX B

Cable Routing Drawing



APPENDIX C

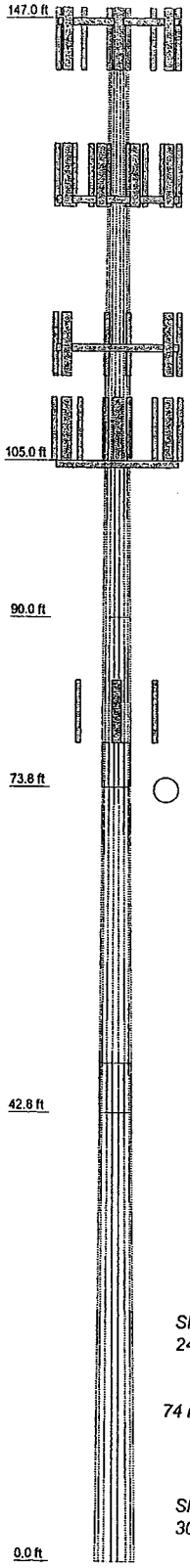
Table C1 - List of Attached Documents

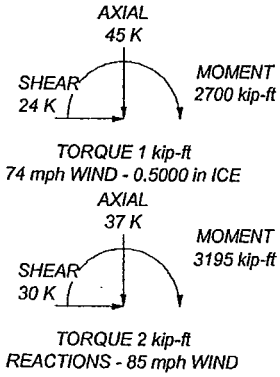
Attachment
ERI Monopole Profile
Base Plate Calculations
Foundation Calculations

Program Version 5.1.2.0 - 3/5/2008 File:G:/TOWER/375_Crown_Castle/2008/37508-0592_BU 876316 WO 208048/37508-0592 PASSING.eri

Section	1	2	3	4	5
Length (ft)	42.00	18.75	16.25	35.25	47.50
Number of Sides	18	18	18	18	18
Thickness (in)	0.2500	0.3125	0.4843	0.5240	0.5604
Lap Splice (ft)	3.75		4.25	4.75	
Top Dia (in)	22.0000	28.0034	31.1900	32.2632	36.6990
Bot Dia (in)	29.1410	31.1900	33.9550	38.6010	45.1200
Grade	A607-60				
Weight (K)	2.9	1.9	2.7	7.0	11.8

26.0





TORQUE 1 kip-ft
74 mph WIND - 0.5000 in ICE

TORQUE 2 kip-ft
REACTIONS - 85 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
12' Low Profile Platform	147	12' Low Profile Platform	116
(3) FV65-14-00NA2 w/Mount Pipe	145	(3) Powerwave Technologies 7770 w/ Mount Pipe	108
(3) FV65-14-00NA2 w/Mount Pipe	145		
(3) FV65-14-00NA2 w/Mount Pipe	145	(3) Powerwave Technologies 7770 w/ Mount Pipe	108
(4) FR90-12-00DAL2 w/Mount Pipe	132		
(4) FR90-12-00DAL2 w/Mount Pipe	132	(3) Powerwave Technologies 7770 w/ Mount Pipe	108
(4) FR90-12-00DAL2 w/Mount Pipe	132		
12' Low Profile Platform	130	(4) Powerwave Technologies LGP2140X	108
(2) Antel LPA-185090/8CFx2 w/ mount pipe	116	(4) Powerwave Technologies LGP2140X	108
(2) Antel LPA-185090/8CFx2 w/ mount pipe	116	(4) Powerwave Technologies LGP2140X	108
(2) DB844H80-XY w/Mount Pipe	116	12' Low Profile Platform	105
(2) DB844H80-XY w/Mount Pipe	116	Kathrein OG-860/1920/GPS-A	81
(2) Antel LPA-80063/6CF w/ Mount Pipe	116	Kathrein OG-860/1920/GPS-A	81
(2) Antel LPA-185090/8CFx2 w/ mount pipe	116	Kathrein OG-860/1920/GPS-A	81
(2) ADC DUAL BAND 800/1900 FULL BAND	116	3' Side Arm Mount	80
		3' Side Arm Mount	80
		3' Side Arm Mount	80

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-60	60 ksi	75 ksi			

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 93.1%

Paul J Ford and Company
250 E. Broad Street Suite 1500
Columbus, OH 43215
Phone: 614.221.6679
FAX: 614.448.4105

Job: *Ex. 147 ft Monopole, Secondino, Property Branford, CT*			
Project: *PJF #37508-0592 / BU #876316*			
Client: Crown Castle International	Drawn by: Scott Kramer	App'd:	
Code: TIA/EIA-222-F	Date: 05/07/08	Scale: NTS	
Path: G:\TOWER\375 Crown Castle\2006\37508-0592_BU 876316 WO 205048\37508-0592 PASSING.eri		Dwg No. E-1	

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 500 • Columbus, Ohio 43215
Ph: (614) 221-6679 • Fax1: (614) 221-2540 • Fax2: (614) 221-0166

MONOPOLE BASE PLATE ANALYSIS

TITLE: 150-FT MONOPOLE
SITE: SECONDINO PROPERTY
OWNER: CCI
COMM. NO: 37508-0592
DATE: 07-May-08

Number of Sides	18	Stress Increase	1.33
Shaft Dia, DF	45.120 in.	Base Plate Shape	SQUARE
PT-to-PT, DP	45.816 in.		
Min Bolt Circle	49.12 in.	Actual Bolt Circle	52.00 in.

Base Reactions

Moment	3195.0 ft-kips
Axial Load	37.0 kips
Base Elevation	0.0 ft

Bolt Details

Number of Bolts	16
Bolt Diameter	2 1/4 inches
Bolt Type	A615 #18J
Mom. Of Inertia	5408.00 inches4
Bolt Tension, T	184.33 kips
Allowable Tension	195.00 kips
Bolt Compression, C	186.64 kips
Actual / Allowable Ratio	94.5% ☑

Base Plate Details

Plate Moment, MPL	1728.28 inch-kips
Bend Plane, W	29.83 inches
Plate Thickness, t	3.00 inches
Plate Width	53.00 inches
Plate Steel Spec.	ASTM A572 GRADE 50
Plate Steel Grade	50.00 ksi
Actual Stress	38.62 ksi
Allowable Stress	50.00 ksi
Actual / Allowable Ratio	77.2% ☑

This base plate check uses Crown Castles's Accepted Methodology to reduce the plate bending moment arm by 1/2 the diameter of the anchor nut.

Base Plate Analysis Summary

Plate Thickness	3.00 in.	Bolt Circle	52.00 in.
Plate Length	53.00 in.	Bolt Diameter	2.25 in.
Number of Bolts	16	Bolt Type	A615 #18J

PJF_Pole (tm) - Monopole Design Program
Windows Version 3.04.0000 Wed May 7, 2008 - 2:52:31 pm
(c) 1993 to 2000 PAUL J. FORD AND COMPANY, Columbus, Ohio

Job No.....: 37508-0592 Design No: BU# 876316 Engineer : DSK
Description : 147-FT MONOPOLE - SECONDINO PROPERTY
Design..... : 85 MPH / 74 MPH +1/2" RADIAL ICE
Owner..... : Crown Castle Client: Crown Castle 2008
Status..... : Preliminary Design Revision: Rev. Date :

S U M M A R Y O F C U R R E N T C A I S S O N D E S I G N

Diameter (ft) .....:	7.00	Compression (kips):	37.00	Friction S.F .....:	2.00
Min. Depth (ft) ...:	22.00	Horizontal (kips) :	30.00	Lateral S.F .....:	2.00
Depth Used (ft) ...:	22.50	Uplift (kips) ....:	0.00	Concrete S.F .....:	1.30
Rebar Area (in^2) .:	49.92	Moment (Ft-kips) .:	3195.0	Concrete F'c (psi) :	3000.0
Rebar Used .....:	(32)#11	Full Cohesion (ft):	21.00	Steel Cover (in) ..:	4.00
Water at (ft) .....:	5.00	Rock at (ft) .....:	26.00		

SOIL PROFILE :

Soil Layer	Layer Thickness (ft)	Unit Weight (pcf)	Ult. Skin Friction (psf)	Allowable Bearing (psf)	Friction Angle- Phi (deg)	Passive Coeff.- KP	Cohesion (c) (psf)
1	3.00	100.00	0.00	0.00	0.00	1.000	0.00
2	2.00	100.00	0.00	0.00	36.00	3.852	0.00
3	2.50	72.60	0.00	0.00	36.00	3.852	0.00
4	13.50	72.60	0.00	8000.00	40.00	4.599	0.00
5	5.00	72.60	0.00	8000.00	40.00	4.599	0.00

LATERAL / MOMENT CAPACITY (CHECK) :	Min Design	Actual Design
Caisson Diameter (ft) .....:	7.00	7.00
Height Above Grade (ft) .....:	0.50	0.50
Depth Below Grade (ft) .....:	22.00	22.50
Concrete Volume (CY) .....:	32.07	32.78
Applied Moment From Loads (Working), Mwork(Ft-kip):	3684.00	3694.50
Resisting Moment From Soil (Ult), Mult(Ft-kip) ...:	7596.49	8023.24
Moment S.F. (Mult / Mwork) .....:	2.06	2.17
Applied Horizontal Load (Working), Hwork (Kips) ..:	30.00	30.00
Horizontal Soil Resistance (Ultimate), Hult (Kips):	68.34	71.39
Horizontal S.F. (Hult / Hwork) .....:	2.28	2.38
Center of Rotation (from grade) (ft) .....:	15.80	16.15
Inflection Point (Max Design Moment Location (ft) :	5.10	5.20
Maximum Factored Design Moment for Reinf. (Ft-kip):	4530.51	4530.51
Area Steel Required From Loads (in^2) .....:	25.80	25.80
ACI Minimum Steel (0.5%) (in^2) .....:	27.71	27.71
Area Reinf. Steel Provided (in^2) .....:	49.92	49.92

UPLIFT CAPACITY CHECK :		
Actual Uplift on Caisson (Kips) .....:	0.00	0.00
Allowable Uplift Capacity (Kips) .....:	71.25	72.60

COMPRESSION CAPACITY CHECK :		
Actual Compression on Caisson (Kips) .....:	37.00	37.00
Total Compression (Includes Concrete Wt.) (Kips) .:	82.22	83.18
Allowable Compression Capacity (Kips) .....:	307.88	307.88

CAISSON DESIGN:
USE: 7.00 ft Diameter X 23.00 ft Long (Concrete Volume = 32.78 CY)
Reinf: (32)#11 Vert, w/Closed Ties: (14)#5 @6.0", remaining ties @18.0" (ASTM A615)

CROWN CASTLE USA PROJECT: BU 876316; SECONDINO PROPERTY; BRANDFORD, CONNECTICUT
MONOPOLE RETROFIT PROJECT MASTER NOTES DOCUMENT

UPON THE SUCCESSFUL AND COMPLETE INSTALLATION OF THE REINFORCING SYSTEM SPECIFIED IN THESE PLANS, THE REINFORCED POLE MEETS THE WIND DESIGN RECOMMENDATIONS OF THE TIA/EIA-222-F-1996 STANDARD FOR WIND SPEEDS OF 85 MPH AND 74 MPH + 1/2" RADIAL ICE

A. GENERAL NOTES

1. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS PRIOR TO FABRICATION AND CONSTRUCTION. THESE DRAWINGS WERE PREPARED FROM INFORMATION AND DOCUMENTS PROVIDED TO PAUL J. FORD AND COMPANY BY CROWN CASTLE USA ("CCUSA", OWNER). THIS INFORMATION PROVIDED HAS NOT BEEN FIELD VERIFIED BY PAUL J. FORD AND COMPANY FOR ACCURACY AND THEREFORE DISCREPANCIES BETWEEN THESE DRAWINGS AND ACTUAL SITE CONDITIONS SHOULD BE ANTICIPATED. ANY DISCREPANCIES AND/OR CHANGES BETWEEN THE INFORMATION CONTAINED IN THESE DRAWINGS AND THE ACTUAL VERIFIED SITE CONDITIONS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF CROWN CASTLE USA AND PAUL J. FORD AND COMPANY SO THAT ANY CHANGES AND/OR ADJUSTMENTS, IF NECESSARY, CAN BE MADE TO THE DESIGN AND DRAWINGS.
2. THE EXISTING UNREINFORCED MONOPOLE STRUCTURE DOES NOT HAVE THE STRUCTURAL CAPACITY TO CARRY ALL OF THE ANTENNA AND PLATFORM LOADS SHOWN ON THESE DRAWINGS AT THE REQUIRED MINIMUM TIA/EIA-222-F BASIC WIND SPEEDS. DO NOT INSTALL ANY ADDITIONAL OR NEW ANTENNA AND PLATFORM LOADS UNTIL THE MONOPOLE REINFORCING SYSTEM IS COMPLETELY AND SUCCESSFULLY INSTALLED.
3. IF MATERIALS, QUANTITIES, STRENGTHS OR SIZES INDICATED BY THE DRAWINGS OR SPECIFICATIONS ARE NOT IN AGREEMENT WITH THESE NOTES, THE BETTER QUALITY AND/OR GREATER QUANTITY, STRENGTH OR SIZE INDICATED, SPECIFIED OR NOTED SHALL BE PROVIDED.
4. THIS STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER THE INSTALLATION OF THE REINFORCING REPAIR SYSTEM HAS BEEN PROPERLY AND ADEQUATELY COMPLETED. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO INSURE THE SAFETY AND STABILITY OF THE MONOPOLE AND ITS COMPONENT PARTS DURING FIELD MODIFICATIONS. THIS INCLUDES, BUT IS NOT LIMITED TO, THE ADDITION OF WHATEVER TEMPORARY BRACING, GUYS OR TIE DOWNS THAT MAY BE NECESSARY. SUCH MATERIAL SHALL BE REMOVED AND SHALL REMAIN THE PROPERTY OF THE CONTRACTOR AFTER THE COMPLETION OF THE PROJECT. IMPORTANT CUTTING, WELDING AND SAFETY GUIDELINES: THE CONTRACTOR SHALL FOLLOW ALL CCUSA CUTTING, WELDING, FIRE PREVENTION AND SAFETY GUIDELINES. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL OBTAIN A COPY OF THE CURRENT CCUSA GUIDELINES FROM CCUSA. PER THE 12-91-2005 CCUSA DIRECTIVE: "ALL CUTTING AND WELDING ACTIVITIES SHALL BE CONDUCTED IN ACCORDANCE WITH CCUSA POLICY 'CUTTING AND WELDING PLAN' (DOC # ENG-PLN-10015) ON AN ONGOING BASIS THROUGHOUT THE ENTIRE LIFE OF THE PROJECT".
5. THE STRUCTURAL CONTRACT DOCUMENTS DO NOT INDICATE THE METHOD OR MEANS OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES. OBSERVATION VISITS TO THE SITE BY THE OWNER AND/OR THE ENGINEER SHALL NOT INCLUDE INSPECTIONS OF THE PROTECTIVE MEASURES OR THE CONSTRUCTION PROCEDURES.
6. ANY SUPPORT SERVICES PERFORMED BY THE ENGINEER DURING CONSTRUCTION SHALL BE DISTINGUISHED FROM CONTINUOUS AND DETAILED INSPECTION SERVICES WHICH ARE FURNISHED BY THE INSPECTION/TESTING AGENCY. THESE SUPPORT SERVICES PERFORMED BY THE ENGINEER ARE SOLELY FOR THE PURPOSE OF ASSISTING IN QUALITY CONTROL AND IN ACHIEVING CONFORMANCE WITH CONTRACT DOCUMENTS. THEY DO NOT GUARANTEE CONTRACTOR'S PERFORMANCE AND SHALL NOT BE CONSTRUED AS SUPERVISION OF CONSTRUCTION.
7. ALL MATERIALS AND EQUIPMENT FURNISHED WILL BE NEW AND OF GOOD QUALITY, FREE FROM FAULTS AND DEFECTS AND IN CONFORMANCE WITH THE CONTRACT DOCUMENTS. ANY AND ALL SUBSTITUTIONS MUST BE PROPERLY APPROVED AND AUTHORIZED IN WRITING BY THE OWNER AND ENGINEER PRIOR TO INSTALLATION. THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE AS TO THE KIND AND QUALITY OF MATERIALS AND EQUIPMENT BEING SUBSTITUTED.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THE CONTRACTOR IS RESPONSIBLE TO INSURE THAT THIS PROJECT AND RELATED WORK COMPLIES WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL SAFETY CODES AND REGULATIONS GOVERNING THIS WORK AS WELL AS CCUSA SAFETY GUIDELINES.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING AND NEW COAXIAL CABLES AND OTHER EQUIPMENT DURING CONSTRUCTION.
10. ANY EXISTING ATTACHMENTS AND/OR PROJECTIONS ON THE POLE THAT MAY INTERFERE WITH THE INSTALLATION OF THE REINFORCING SYSTEM WILL HAVE TO BE REMOVED, AND/OR RELOCATED, AND/OR REPLACED AND RE-INSTALLED AFTER THE REINFORCING IS SUCCESSFULLY COMPLETED. THE CONTRACTOR SHALL IDENTIFY AND COORDINATE THESE ITEMS PRIOR TO CONSTRUCTION WITH THE OWNER, TESTING AGENCY, AND ENGINEER.
11. ANY AND ALL EXISTING PLATFORMS THAT ARE LOCATED IN AREAS OF THE POLE SHAFT WHERE SHAFT REINFORCING MUST BE APPLIED SHALL BE TEMPORARILY REMOVED OR OTHERWISE SUPPORTED TO PERMIT NEW CONTINUOUS REINFORCEMENT TO BE ATTACHED AFTER THE CONTRACTOR HAS SUCCESSFULLY INSTALLED THE MONOPOLE REINFORCEMENT SYSTEM. THE CONTRACTOR SHALL RE-INSTALL THE PLATFORMS. IN NO CASE SHALL ANY NEW AND/OR ADDITIONAL PLATFORMS AND/OR ANTENNAS AND/OR COAX CABLES AND/OR OTHER EQUIPMENT BE INSTALLED ON THE MONOPOLE UNTIL THE CONTRACTOR HAS SUCCESSFULLY COMPLETED THE INSTALLATION OF ALL OF THE REQUIRED STRUCTURAL REINFORCING SYSTEM COMPONENTS.

B. "LOW HEAT" WELDING PROCEDURES:

1. ANY AND ALL FIELD WELDING REQUIRED ON THIS PROJECT SHALL BE PERFORMED BY AWS CERTIFIED WELDERS USING "LOW HEAT" WELDING TECHNIQUES.
2. FOR THE PURPOSES OF THIS PROJECT, "LOW HEAT" WELDING IS DEFINED AS A CAREFUL AND CONTROLLED WELDING PROCESS, PERFORMED BY EXPERIENCED AWS CERTIFIED WELDERS, SUCH THAT THE CORRECT AMOUNT OF WELD METAL IS DEPOSITED AND IS PROPERLY FUSED IN SUCH A WAY THAT EXCESSIVE AMOUNTS OF HEAT BUILDUP AT THE WELDED JOINT, DUE TO EXCESSIVE MOLTEN WELD METAL POOLING, IS AVOIDED.
3. THE "LOW HEAT" WELDING PROCESS SHALL BE SET UP SO THAT ANY FIELD WELDING ACTIVITY ON THE POLE STRUCTURE DOES NOT SCORCH OR OTHERWISE DAMAGE THE EXISTING GALVANIZED SURFACE ON THE INSIDE OF THE POLE SHAFT IN AND AROUND THE REGION OF THE WELD.
4. THE "LOW HEAT" WELDING PROCESS, USED IN CONJUNCTION WITH THE CCUSA COAX PROTECTION AND FIRE SAFETY GUIDELINES, SHALL BE SET UP SO THAT ANY FIELD WELDING ACTIVITY ON THE POLE STRUCTURE DOES NOT SCORCH AND/OR OTHERWISE DAMAGE THE EXISTING COAX CABLES THAT RUN ON THE INSIDE AND/OR OUTSIDE OF THE POLE SHAFT IN AND AROUND THE REGION OF THE WELD.
5. "LOW HEAT" WELD DEMONSTRATION REQUIRED: PRIOR TO BEGINNING THE FIELD WELDING FOR THE REINFORCEMENT WORK, THE CONTRACTOR'S AWS CERTIFIED WELDER SHALL DEMONSTRATE THE "LOW HEAT" WELDING PROCESS THAT WILL BE USED ON THIS PROJECT SO THAT CCUSA REPRESENTATIVES CAN OBSERVE AND VERIFY THAT THE PROPOSED PROCESS DOES NOT DAMAGE THE EXISTING GALVANIZED SURFACE ON THE BACK SIDE OF THE SAMPLE PLATE THAT IS USED. LOW TEMPERATURE MONITORING DEVICES SUCH AS THERMOCOUPLE, HEAT CRAYON, AND/OR INFRARED SENSOR TO MEASURE AND DEMONSTRATE THE TEMPERATURE OF THE STEEL ON THE BACK SURFACE IN THE REGION OF THE WELD. THE "LOW HEAT" WELD DEMONSTRATION SHALL BE CARRIED OUT ON-SITE AND USING A GALVANIZED STEEL PLATE SAMPLE WITH A THICKNESS EQUAL TO THE MINIMUM SHAFT THICKNESS THAT WILL BE REINFORCED. ONLY AFTER THE "LOW HEAT" TECHNIQUES HAVE BEEN SUCCESSFULLY DEMONSTRATED AND ARE APPROVED BY CCUSA REPRESENTATIVES, CAN THE CONTRACTOR PROCEED WITH THE FIELD WELDING ON THE STRUCTURE.
6. CAUTION: THE CONTRACTOR SHALL CAREFULLY FOLLOW ALL CCUSA CUTTING, WELDING, FIRE SAFETY, AND ALL OTHER SAFETY GUIDELINES WHICH ALSO INCLUDE "LOW HEAT" WELDING TECHNIQUES. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR MAINTAINING THE SAFETY AND STABILITY OF THE STRUCTURE DURING CONSTRUCTION. THE CONTRACTOR SHALL BE HELD FULLY LIABLE FOR ANY DAMAGE (INCLUDING HEAT AND FIRE DAMAGE CAUSED BY FIELD WELDING) TO THE STRUCTURE AND ANY OF ITS COMPONENTS WHICH OCCURS DURING CONSTRUCTION.

C. SPECIAL INSPECTION AND TESTING

1. ALL WORK SHALL BE SUBJECT TO REVIEW AND OBSERVATION BY THE OWNER'S REPRESENTATIVE AND THE OWNER'S AUTHORIZED INDEPENDENT INSPECTION AND TESTING AGENCY.
2. ANY SUPPORT SERVICES PERFORMED BY THE ENGINEER DURING CONSTRUCTION SHALL BE DISTINGUISHED FROM CONTINUOUS AND DETAILED INSPECTION SERVICES WHICH ARE FURNISHED BY OTHERS. THESE SUPPORT SERVICES PERFORMED BY THE ENGINEER ARE PERFORMED SOLELY FOR THE PURPOSE OF ASSISTING IN QUALITY CONTROL AND IN ACHIEVING CONFORMANCE WITH CONTRACT DOCUMENTS. THEY DO NOT GUARANTEE CONTRACTOR'S PERFORMANCE AND SHALL NOT BE CONSTRUED AS SUPERVISION OF CONSTRUCTION.
3. OBSERVED DISCREPANCIES BETWEEN THE WORK AND THE CONTRACT DOCUMENTS SHALL BE CORRECTED BY THE CONTRACTOR AT NO ADDITIONAL COST.
4. AN INDEPENDENT QUALIFIED INSPECTION/TESTING AGENCY SHALL BE SELECTED, RETAINED AND PAID FOR BY THE OWNER FOR THE SOLE PURPOSE OF INSPECTING, TESTING, DOCUMENTING, AND APPROVING ALL WELDING AND FIELD WORK PERFORMED BY THE CONTRACTOR.
   (A.) ACCESS TO ANY PLACE WHERE WORK IS BEING DONE SHALL BE PERMITTED AT ALL TIMES.
   (B.) THE INSPECTION AGENCY SHALL SO SCHEDULE THIS WORK AS TO CAUSE A MINIMUM OF INTERRUPTION TO, AND COORDINATE WITH, THE WORK IN PROGRESS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE THE WORK SCHEDULE WITH THE TESTING AGENCY. THE CONTRACTOR SHALL ALLOW FOR ADEQUATE TIME AND ACCESS FOR THE TESTING AGENCY TO PERFORM THEIR DUTIES.
5. THE INSPECTION AND TESTING AGENCY SHALL BE RESPONSIBLE TO PERFORM THE FOLLOWING SERVICES FOR THE OWNER. THE TESTING AGENCY SHALL INSPECT THE FOLLOWING ITEMS IN ACCORDANCE WITH THE CONSTRUCTION DRAWINGS. THE TESTING AGENCY SHALL INSPECT ITEMS ON THIS LIST AND OTHER ITEMS AS NECESSARY TO FULFILL THEIR RESPONSIBILITY. THE TESTING AGENCY SHALL UTILIZE EXPERIENCED, TRAINED INSPECTORS INCLUDING AWS CERTIFIED WELDING INSPECTORS (CWI). INSPECTORS SHALL HAVE THE TRAINING, CREDENTIALS, AND EXPERIENCE APPROPRIATE FOR AND COMMENSURATE WITH THE SCOPE AND TYPE OF INSPECTION WORK TO BE PERFORMED.

A. GENERAL:
   (1.) PERFORM CONTINUOUS ON-SITE OBSERVATION, INSPECTION, VERIFICATION, AND TESTING DURING THE TIME THE CONTRACTOR IS WORKING ON-SITE. AGENCY SHALL NOTIFY OWNER IMMEDIATELY WHEN FIELD PROBLEMS OR DISCREPANCIES OCCUR.

B. FOUNDATIONS, CONCRETE, AND SOIL PREPARATION

C. CONCRETE TESTING PER ACI

D. STRUCTURAL STEEL
   (1.) CHECK THE STEEL ON THE JOB WITH THE PLANS.
   (2.) CHECK MILL CERTIFICATIONS.
   (3.) CHECK GRADE OF STEEL MEMBERS, AND BOLTS FOR CONFORMANCE WITH DRAWINGS.
   (4.) INSPECT STEEL MEMBERS FOR DISTORTION, EXCESSIVE RUST, FLAWS AND BURNED HOLES.
   (5.) CALL FOR LABORATORY TEST REPORTS WHEN IN DOUBT.
   (6.) CHECK STEEL MEMBERS FOR SIZES, SWEEP AND DIMENSIONAL TOLERANCES.
   (7.) CHECK FOR SURFACE FINISH SPECIFIED, GALVANIZED.

E. WELDING:
   (1.) VERIFY FIELD WELDING PROCEDURES, WELDERS, AND WELDING OPERATORS, NOT DEEMED PREQUALIFIED, IN ACCORDANCE WITH AWS D1.1.
   (2.) INSPECT FIELD WELDED CONNECTIONS IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED AND IN ACCORDANCE WITH AWS D1.1.
   (3.) APPROVE FIELD WELDING SEQUENCE.
      (A) A PROGRAM OF THE APPROVED SEQUENCES SHALL BE SUBMITTED TO THE OWNER BEFORE WELDING BEGINS. NO CHANGE IN APPROVED SEQUENCES MAY BE MADE WITHOUT PERMISSION FROM THE OWNER.
   (4.) INSPECT WELDED CONNECTIONS AS FOLLOWS AND IN ACCORDANCE WITH AWS D1.1:
      (A) INSPECT WELDING EQUIPMENT FOR CAPACITY, MAINTENANCE AND WORKING CONDITIONS.
      (B) VERIFY SPECIFIED ELECTRODES AND HANDLING AND STORAGE OF ELECTRODES FOR CONFORMANCE TO SPECIFICATIONS.
      (C) INSPECT PREHEATING AND INTERPASS TEMPERATURES FOR CONFORMANCE WITH AWS D1.1.
      (D) VISUALLY INSPECT ALL WELDS AND VERIFY THAT QUALITY OF WELDS MEETS THE REQUIREMENTS OF AWS D1.1.
      (E) SPOT TEST AT LEAST ONE FILLET WELD OF EACH MEMBER USING MAGNETIC PARTICLE OR DYE PENETRANT.
      (F) INSPECT FOR SIZE, SPACING, TYPE AND LOCATION AS PER APPROVED PLANS.
      (G) VERIFY THAT THE BASE METAL CONFORMS TO THE DRAWINGS.
      (H) REVIEW THE REPORTS BY TESTING LABS.
      (I) CHECK TO SEE THAT WELDS ARE CLEAN AND FREE FROM SLAG.
      (J) INSPECT RUST PROTECTION OF WELDS AS PER SPECIFICATIONS.
      (K) CHECK THAT DEFECTIVE WELDS ARE CLEARLY MARKED AND HAVE BEEN ADEQUATELY REPAIRED.

F. SPECIAL INSPECTION OF EXISTING SHAFT-TO-FLANGE WELD CONNECTIONS:
   (1.) PRIOR TO CONSTRUCTION, TESTING AGENCY SHALL INSPECT CONDITION OF EXISTING SHAFT-TO-BASE-PLATE WELD CONNECTION. ALSO INSPECT EXISTING STIFFENERS IF PRESENT. THE INSPECTOR SHALL USE THE FOLLOWING INSPECTION METHODS, OR COMBINATION OF METHODS, AS REQUIRED TO IDENTIFY ANY CRACKS: VISUAL, MAGNETIC PARTICLE, AND/OR ULTRA-SONIC. IN ADDITION, OTHER TEST METHODS MAY ALSO BE USED AT THE RECOMMENDATION OF THE TESTING AGENCY AND UPON THE APPROVAL OF THE OWNER AND THE ENGINEER. THE TESTING AGENCY SHALL PROVIDE CAREFUL AND THOROUGH DOCUMENTATION OF THIS INSPECTION TO THE OWNER AND THE ENGINEER. TESTING AGENCY SHALL COORDINATE THESE INSPECTION ACTIVITIES WITH THE OWNER'S REQUIRED PROCESSES AND PROCEDURES. IMPORTANT: THE TESTING AGENCY SHALL IMMEDIATELY REPORT ANY INDICATIONS OF CRACKS, FRACTURES, DISTRESS, AND/OR CORROSION TO THE OWNER AND ENGINEER.
   (2.) AFTER CONSTRUCTION, TESTING AGENCY SHALL INSPECT ANY AND ALL FIELD REPAIRS IMPLEMENTED AS REQUIRED BY THE OWNER FROM THE RESULTS OF THE INSPECTION IN THE PREVIOUS NOTE 5.F.(1.) ABOVE.

G. REPORTS:
   (1.) COMPILE AND PERIODICALLY SUBMIT DAILY INSPECTION REPORTS TO THE OWNER.

6. THE INSPECTION PLAN OUTLINED HEREIN IS INTENDED AS A DESCRIPTION OF GENERAL AND SPECIFIC ITEMS OF CONCERN. IT IS NOT INTENDED TO BE ALL-INCLUSIVE. IT DOES NOT LIMIT THE TESTING AND INSPECTION AGENCY TO THE ITEMS LISTED. ADDITIONAL TESTING, INSPECTION, AND CHECKING MAY BE REQUIRED AND SHOULD BE ANTICIPATED. THE TESTING AGENCY SHALL USE THEIR PROFESSIONAL JUDGMENT AND KNOWLEDGE OF THE JOB SITE CONDITIONS AND THE CONTRACTOR'S PERFORMANCE TO DECIDE WHAT OTHER ITEMS REQUIRE ADDITIONAL ATTENTION. THE TESTING AGENCY'S JUDGMENT MUST PREVAIL ON ITEMS NOT SPECIFICALLY COVERED. ANY DISCREPANCIES AND PROBLEMS SHALL BE BROUGHT IMMEDIATELY TO THE OWNER'S ATTENTION. RESOLUTIONS ARE NOT TO BE MADE WITHOUT THE OWNER'S REVIEW AND SPECIFIC WRITTEN CONSENT. THE OWNER RESERVES THE RIGHT TO DETERMINE WHAT IS AN ACCEPTABLE RESOLUTION OF DISCREPANCIES AND PROBLEMS.
7. AFTER EACH INSPECTION, THE TESTING AGENCY WILL PREPARE A WRITTEN ACCEPTANCE OR REJECTION WHICH WILL BE GIVEN TO THE CONTRACTOR AND FILED AS DAILY REPORTS TO THE OWNER. THIS WRITTEN ACTION WILL GIVE THE CONTRACTOR A LIST OF ITEMS TO BE CORRECTED, PRIOR TO CONTINUING CONSTRUCTION, AND/OR LOADING OF STRUCTURAL ITEMS.
8. RESPONSIBILITY: THE TESTING AGENCY DOES NOT RELIEVE THE CONTRACTOR'S CONTRACTUAL OR STATUTORY OBLIGATIONS. THE CONTRACTOR HAS THE SOLE RESPONSIBILITY FOR ANY DEVIATIONS FROM THE OFFICIAL CONTRACT DOCUMENTS. THE TESTING AGENCY WILL NOT REPLACE THE CONTRACTOR'S QUALITY CONTROL PERSONNEL.

D. STRUCTURAL STEEL

1. STRUCTURAL STEEL MATERIALS, FABRICATION, DETAILING, AND WORKMANSHIP SHALL CONFORM TO THE LATEST EDITION OF THE FOLLOWING REFERENCE STANDARDS:

A. BY THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC):
   (A.) "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS."
   (B.) "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS," AS APPROVED BY THE RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS OF THE ENGINEERING FOUNDATION.
   (C.) "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES" (PARAGRAPH 4.2.1 SPECIFICALLY EXCLUDED).

B. BY THE AMERICAN WELDING SOCIETY (AWS):
   (A.) "STRUCTURAL WELDING CODE - STEEL D1.1."
   (B.) "SYMBOLS FOR WELDING AND NON-DESTRUCTIVE TESTING"

2. ANY MATERIAL OR WORKMANSHIP WHICH IS OBSERVED TO BE DEFECTIVE OR INCONSISTENT WITH THE CONTRACT DOCUMENTS SHALL BE CORRECTED, MODIFIED, OR REPLACED AT THE CONTRACTOR'S EXPENSE.
3. WELDED CONNECTIONS SHALL CONFORM TO THE LATEST REVISED CODE OF THE AMERICAN WELDING SOCIETY, AWS D1.1.
4. ALL WELDED CONNECTIONS SHALL BE MADE BY WELDERS CERTIFIED BY AWS. CONTRACTOR SHALL SUBMIT WELDERS' CERTIFICATION AND QUALIFICATION DOCUMENTATION TO THE OWNER'S TESTING AGENCY FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
5. STRUCTURAL STEEL PLATES SHALL CONFORM TO ASTM A572 GRADE 65 (FY = 65 KSI MIN.) UNLESS NOTED OTHERWISE ON THE DRAWINGS.
6. SURFACES OF EXISTING STEEL SHALL BE PREPARED AS REQUIRED FOR FIELD WELDING PER AWS. SEE SECTION H NOTES REGARDING TOUCH-UP OF GALVANIZED SURFACES DAMAGED DURING TRANSPORTATION OR ERECTION AND ASSEMBLY AS WELL AS FIELD WELDING.
7. UNLESS OTHERWISE NOTED, ALL STEEL MEMBERS SHALL BE HOT-DIP GALVANIZED, AFTER FABRICATION, IN ACCORDANCE WITH ASTM A123. SEE SECTION I FOR FURTHER NOTES AND FOR EXCEPTIONS (IF ANY).
8. ALL WELDS SHALL BE VISUALLY INSPECTED BY THE OWNER'S APPROVED TESTING AGENCY. OTHER TESTS MAY ALSO BE PERFORMED ON THE WELDS BY THE TESTING AGENCY IN ORDER FOR THEM TO PERFORM THEIR DUTIES FOR THIS PROJECT. THE CONTRACTOR SHALL COOPERATE WITH THE TESTING AGENCY IN THEIR TESTING EFFORTS.
9. NO WELDING SHALL BE DONE TO THE EXISTING STRUCTURE WITHOUT THE PRIOR APPROVAL AND SUPERVISION OF THE TESTING AGENCY.
10. FIELD CUTTING OF STEEL:
   (A.) PRIOR TO ANY FIELD CUTTING, THE CONTRACTOR SHALL MARK THE CUT OUTLINES ON THE STEEL AND THE INSPECTION/TESTING AGENCY SHALL VERIFY PROPOSED LAYOUT, LOCATION, AND DIMENSIONS.
   (B.) ANY REQUIRED CUTS IN THE STEEL SHALL BE CAREFULLY CUT BY MECHANICAL METHODS SUCH AS DRILLING, SAW CUTTING, AND GRINDING. THE CONTRACTOR IS RESPONSIBLE TO PREVENT ANY DAMAGE TO THE COAX CABLES, AND/OR OTHER EQUIPMENT AND/OR THE STRUCTURE, DURING THE CUTTING WORK. ANY DAMAGE TO THE COAX CABLES, AND/OR OTHER EQUIPMENT AND/OR THE STRUCTURE, RESULTING FROM THE CONTRACTOR'S ACTIVITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. THE INSPECTION/TESTING AGENCY SHALL CLOSELY AND CONTINUOUSLY MONITOR THIS ACTIVITY.
   (C.) ALL REQUIRED CUTS SHALL BE CUT WITHIN THE DIMENSIONS SHOWN ON THE DRAWINGS. NO CUTS SHALL EXTEND BEYOND THE OUTLINE OF THE DIMENSIONS SHOWN ON THE DRAWINGS. ALL CUT EDGES SHALL BE GROUND SMOOTH AND DE-BURRED. CUT EDGES THAT ARE TO BE FIELD WELDED SHALL BE PREPARED FOR FIELD WELDING PER AWS D1.1 AND AS SHOWN ON THE DRAWINGS. IT MAY BE NECESSARY TO DRILL STARTER HOLES AS REQUIRED TO MAKE THE CUTS. THE INSPECTION/TESTING AGENCY SHALL CLOSELY AND CONTINUOUSLY MONITOR THIS ACTIVITY.

E. BASE PLATE GROUT

1. NEW GROUT FOR THE POLE BASE SHALL BE NON-SHRINK, NON-METALLIC, GROUT (EUCO NS GROUT BY EUCLID, OR APPROVED EQUAL) WITH A 7500 PSI MINIMUM COMPRESSIVE STRENGTH. PVC DRAINAGE PIPES SHALL BE PROVIDED FROM INSIDE THE POLE SHAFT OUT THROUGH THE GROUT SPACE UNDER THE BASE PLATE IN ORDER TO ALLOW MOISTURE TO ADEQUATELY DRAIN FROM THE INTERIOR OF THE POLE SHAFT. CONTRACTOR SHALL SUBMIT PROPOSED GROUT SPECIFICATION INFORMATION TO THE OWNER FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION. CONTRACTOR SHALL FOLLOW GROUT MANUFACTURER'S SPECIFICATIONS FOR COLD WEATHER GROUTING PROCEDURES (IF NECESSARY) AND THE TESTING AGENCY SHALL PREPARE GROUT SAMPLE SPECIMENS FOR COMPRESSIVE STRENGTH TESTING AND VERIFICATION.
2. GROUT SHALL BE INSTALLED TIGHT UNDER BASE PLATE WITH NO VOIDS REMAINING BETWEEN TOP OF EXISTING CONCRETE AND UNDERSIDE OF EXISTING BASE PLATE (EXCEPT FOR DRAIN PIPES). GROUT COMPLETELY SOLID (EXCEPT FOR DRAIN PIPES) UNDER ENTIRE SURFACE OF BASE PLATE FROM OUTSIDE EDGE TO INSIDE EDGE.

F. FOUNDATION WORK (NOT REQUIRED)

G. CAST-IN-PLACE CONCRETE (NOT REQUIRED)

H. TOUCH UP OF GALVANIZING

1. THE CONTRACTOR SHALL TOUCH UP ANY AND/OR ALL AREAS OF GALVANIZING ON THE EXISTING STRUCTURE OR NEW COMPONENTS THAT ARE DAMAGED OR ABRADED DURING CONSTRUCTION. GALVANIZED SURFACES DAMAGED DURING TRANSPORTATION OR ERECTION AND ASSEMBLY AS WELL AS ANY AND ALL ABRASIONS, CUTS, FIELD DRILLING, AND ALL FIELD WELDING SHALL BE TOUCHED UP WITH TWO (2) COATS OF ZRC-BRAND ZINC-RICH COLD GALVANIZING COMPOUND. FILM THICKNESS PER COAT SHALL BE: WET 3.0 MILS; DRY 1.5 MILS. APPLY PER ZRC (MANUFACTURER) RECOMMENDED PROCEDURES. CONTACT ZRC AT 1-800-631-3275 FOR PRODUCT INFORMATION.
2. CONTRACTOR SHALL CLEAN AND PREPARE ALL FIELD WELDS ON GALVANIZED AND PRIME PAINTED SURFACES FOR TOUCH-UP COATING IN ACCORDANCE WITH AWS D1.1. THE OWNER'S TESTING AGENCY SHALL VERIFY THE PREPARED SURFACE PRIOR TO APPLICATION OF THE TOUCH-UP COATING.
3. THE OWNER'S TESTING AGENCY SHALL TEST AND VERIFY THE COATING THICKNESS AFTER THE CONTRACTOR HAS APPLIED THE ZRC COLD GALVANIZING COMPOUND AND IT HAS SUFFICIENTLY DRIED. AREAS FOUND TO BE INADEQUATELY COATED, SHALL BE RE-COATED BY THE CONTRACTOR AND RE-TESTED BY THE TESTING AGENCY.

I. HOT DIP GALVANIZING

1. HOT-DIP GALVANIZE ALL STRUCTURAL STEEL MEMBERS AND ALL STEEL ACCESSORIES, BOLTS, WASHERS, ETC. PER ASTM A123 OR PER ASTM A153, AS APPROPRIATE.
2. PROPERLY PREPARE STEEL ITEMS FOR GALVANIZING.
3. DRILL OR PUNCH WEEP AND/OR DRAINAGE HOLES AS REQUIRED.
4. ALL GALVANIZING SHALL BE DONE AFTER FABRICATION IS COMPLETED AND PRIOR TO FIELD INSTALLATION.

J. PERPETUAL INSPECTION AND MAINTENANCE BY THE OWNER

1. AFTER THE CONTRACTOR HAS SUCCESSFULLY COMPLETED THE INSTALLATION OF THE MONOPOLE REINFORCING SYSTEM AND THE WORK HAS BEEN ACCEPTED BY THE OWNER, THE OWNER WILL BE RESPONSIBLE FOR THE LONG TERM AND PERPETUAL INSPECTION AND MAINTENANCE OF THE POLE AND REINFORCING SYSTEM.
2. THE MONOPOLE REINFORCING SYSTEM INDICATED IN THESE DOCUMENTS USES REINFORCING COMPONENTS THAT INVOLVE FIELD WELDING STEEL MEMBERS TO THE EXISTING GALVANIZED STEEL POLE STRUCTURE. THESE FIELD WELDED CONNECTIONS ARE SUBJECT TO CORROSION DAMAGE AND DETERIORATION IF THEY ARE NOT PROPERLY MAINTAINED AND COVERED WITH CORROSION PREVENTIVE COATING SUCH AS THE ZRC GALVANIZING COMPOUND SPECIFIED PREVIOUSLY. THE STRUCTURAL LOAD CARRYING CAPACITY OF THE REINFORCED POLE SYSTEM IS DEPENDENT UPON THE INSTALLED SIZE AND QUALITY, MAINTAINED SOUND CONDITION AND STRENGTH OF THESE FIELD WELDED CONNECTIONS. ANY CORROSION OF, DAMAGE TO, FATIGUE, FRACTURE, AND/OR DETERIORATION OF THESE WELDS AND/OR THE CONNECTED COMPONENTS WILL RESULT IN THE LOSS OF STRUCTURAL LOAD CARRYING CAPACITY AND MAY LEAD TO FAILURE OF THE STRUCTURAL SYSTEM. THEREFORE, IT IS IMPERATIVE THAT THE OWNER REGULARLY INSPECTS, MAINTAINS, AND REPAIRS AS NECESSARY, ALL OF THESE WELDS, CONNECTIONS, AND COMPONENTS FOR THE LIFE OF THE STRUCTURE.
3. THE OWNER SHALL REFER TO TIA/EIA-222-F-1996, SECTION 14 AND ANNEX E FOR RECOMMENDATIONS FOR MAINTENANCE AND INSPECTION. THE FREQUENCY OF THE INSPECTION AND MAINTENANCE INTERVALS IS TO BE DETERMINED BY THE OWNER BASED UPON ACTUAL SITE AND ENVIRONMENTAL CONDITIONS. PAUL J. FORD AND COMPANY RECOMMENDS THAT A COMPLETE AND THOROUGH INSPECTION OF THE ENTIRE REINFORCED MONOPOLE STRUCTURAL SYSTEM BE PERFORMED YEARLY AND/OR AS FREQUENTLY AS CONDITIONS WARRANT. ACCORDING TO TIA/EIA-222-F-1996 SECTION 14.1, NOTE 1, "IT IS RECOMMENDED THAT THE STRUCTURE BE INSPECTED AFTER SEVERE WIND AND/OR ICE STORMS OR OTHER EXTREME LOADING CONDITIONS".

STATE OF CONNECTICUT
JOSEPH ZACHICARAH JACOBES
No. PEN 22731
LICENSED PROFESSIONAL ENGINEER
MAY 07 2008

ISSUE DATE FOR PERMIT: 05-08-2008

MONOPOLE REINFORCEMENT AND RETROFIT PROJECT
BU 876316; SECONDINO PROPERTY; BRANDFORD, CONNECTICUT

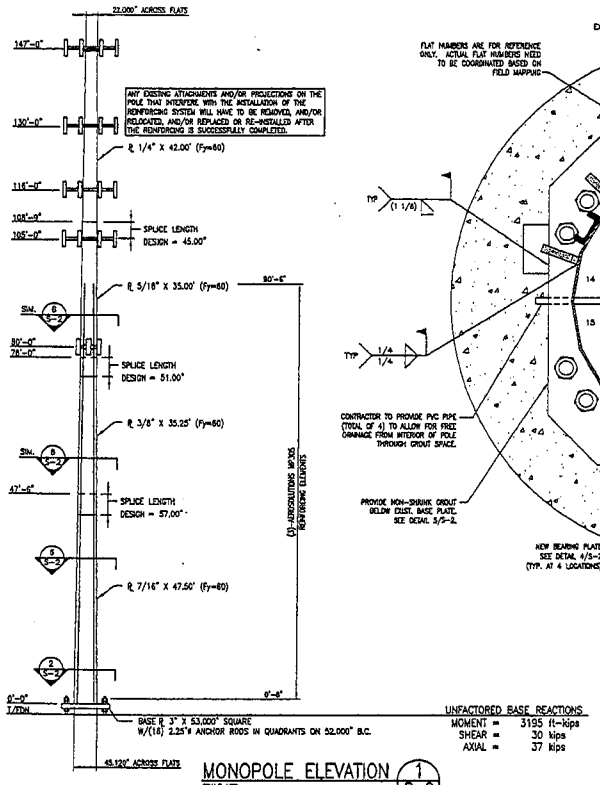
CROWN CASTLE
8905 MONROE ROAD, STE 150, CHARLOTTE, NORTH CAROLINA 28270
PH: (704) 321-3815 FAX: (704) 416-4952

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street - Suite 1300 Columbus, Ohio 43215
(614) 221-6679 www.pjford.com

Job No.	37508-0592
Date	05-08-2008
Scale	N.T.S.
Designed By	D.S.K.
Drawn By	D.T.S.
Checked By	
SHEET NO.	S-1

NOTE: NO DETAILED INFORMATION REGARDING INTERFERENCES WAS PROVIDED. THEREFORE, CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS BEFORE PROCEEDING WITH THE WORK. REPORT ANY AND ALL DISCREPANCIES TO PAUL J. FORD AND COMPANY AND CROWN CASTLE FIELD PERSONNEL IMMEDIATELY.

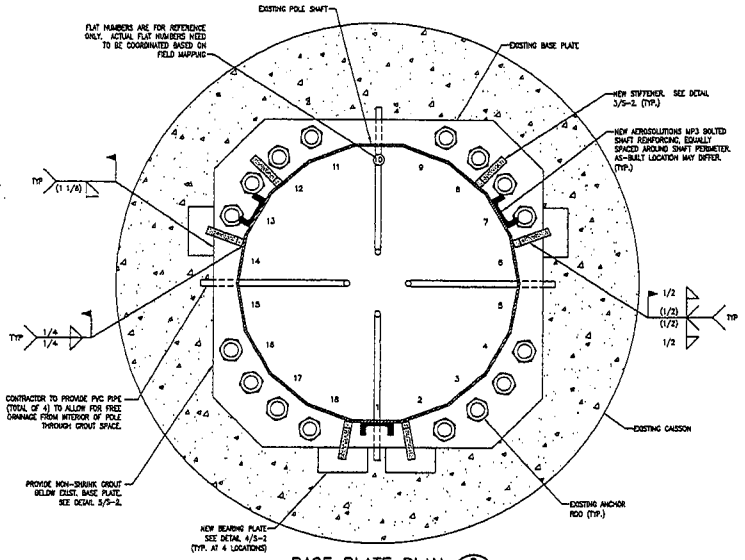
THIS POLE REINFORCEMENT DRAWING IS FOR THE POLE DESIGN AND ANTENNA LOADING DOCUMENTED IN THE PJF CO-LOCATION ANALYSIS FOR THIS SITE (PJF#37508-0592_BP), DATED 05-08-2008.



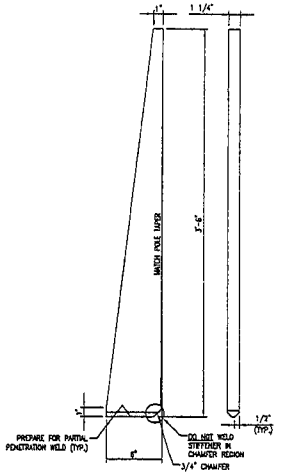
MONOPOLE ELEVATION (1 S-2)
SCALE: NTS

UNFACTORED BASE REACTIONS

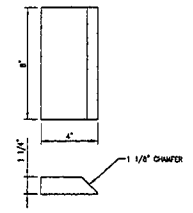
MOMENT	=	3195 ft-kips
SHEAR	=	30 kips
AXIAL	=	37 kips



BASE PLATE PLAN (2 S-2)

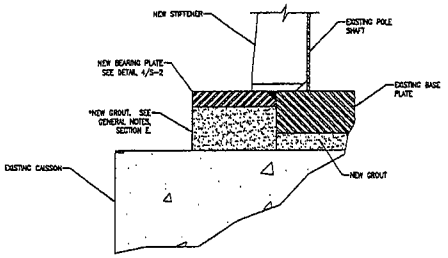


NEW STIFFENER (3 S-2)
(Fy = 65) (TYP. AT 6 LOCATIONS)

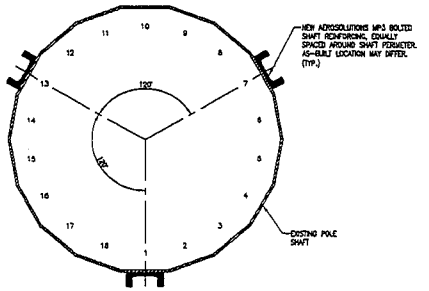


NEW BEARING PLATE (4 S-2)
(Fy = 65) (TYP. AT 4 LOCATIONS)

PROVIDE NON-SHRINK GROUT (NS GROUT BY EUCLID OR APPROVED EQUAL 7500 PSI MIN.) BELOW EXIST. BASE PLATE AND NEW ANCHOR BRACKETS. PRIOR TO GROUTING, INSTALL FOUR 1-INCH DIAMETER PVC DRAIN PIPES AT APPROXIMATELY NINETY (90) DEGREES APART THROUGH GROUT SPACE. GROUT SHALL BE INSTALLED TIGHT UNDER BASE PLATE WITH NO VOIDS REMAINING BETWEEN TOP OF EXISTING CONCRETE AND UNDERSIDE OF EXISTING BASE PLATE (EXCEPT FOR DRAIN PIPES). GROUT COMPLETELY SOLID UNDER ENTIRE SURFACE OF BASE PLATE FROM OUTSIDE EDGE TO INSIDE EDGE.



NEW BEARING PLATE DETAIL (5 S-2)
(TYP. AT 4 LOCATIONS)



SHAFT PLAN (6 S-2)

LOAD CASES

CASE 1	85 MPH WITH NO ICE	DESIGN WIND
CASE 2	74 MPH WITH 1/2" RADIAL ICE	REDUCED WIND WITH ICE
CASE 3	50 MPH WITH NO ICE	OPERATIONAL WIND

POLE SPECIFICATIONS

Pole Shape Type:	18-SIDED POLYGON
Taper:	0.170034 IN/FT
Shaft Steel:	ASTM A607 GRADE 60
Base Pl. Steel:	ASTM A572 GRADE 50 (50 KSI)
Anchor Rods:	2 1/4"ø #18J ASTM A615 GRADE 75

SHAFT SECTION DATA

Shaft Section	Section Length (feet)	Plate Thickness (in.)	Lap Splice (in.)	Diameter Across Flats (inches) @ Top	Diameter Across Flats (inches) @ Bottom
1	42.00	0.2500	45.00	22.000	25.141
2	35.00	0.3125	51.00	28.004	33.955
3	35.25	0.3750	57.00	32.607	38.601
4	47.50	0.4375		37.043	45.120

NOTE: DIMENSIONS SHOWN DO NOT INCLUDE GALVANIZING TOLERANCES

NOTE: THE PROPOSED ANTENNA LOADING SHALL NOT BE PLACED ON THE POLE PRIOR TO COMPLETION OF THE REINFORCEMENT.

STATE OF CONNECTICUT
JOSEPH YACHICARARI JACOBS
No. PEN 22731
LICENSED PROFESSIONAL ENGINEER
MAY 07 2008

ISSUE DATE FOR PERMIT: 05-08-2008

MONOPOLE REINFORCEMENT AND RETROFIT PROJECT
BU 876316; SECONDINO PROPERTY; BRANDFORD, CONNECTICUT

CROWN CASTLE
9105 MONROE ROAD, STE 150, CHARLOTTE, NORTH CAROLINA 28270
PH: (704) 321-3816 FAX: (704) 416-4952

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street Suite 1500 Columbus, Ohio 43215
(614) 221-6679 www.pjfweb.com

Job No. 37508-0592
Date 05-08-2008
Scale N.T.S.
Designed By D.S.K.
Drawn By B.T.C.
Checked By M.J.F.
SHEET NO. S-2